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ABSTRACT

Fifty-eight studies relating to the "knowledge gap" hypothesis (a theory that correlates public knowledge to educational level and mass media exposure) are examined in this report. In the opening sections, the theory is defined, and the early information diffusion studies and public opinion polls that led to its formulation in 1970 are described. In the next sections, pertinent qualities of all the published and unpublished knowledge gap studies are identified and treated as variables for the construction of a table of conclusions about the validity of the hypothesis. These characteristics include (1) date and location of research, (2) sample size, (3) completion rate, (4) type of population, (5) research design, (6) number of measurements in time, (7) method of data collection, (8) topic studies, (9) type of knowledge studied (awareness or depth), (10) operational definitions of education and knowledge gap, (11) an assessment of amount of media publicity involved, and (12) knowledge gap findings (education/knowledge data). The report points out that the data reveal that the theory's proposition--the higher the education, the greater the knowledge of various topics--is supported by most of the studies, but its other proposal about the correlation between knowledge and mass media levels is not. Future considerations for research follow the conclusions, as do three tables in which the review data are presented and summarized. (JL)

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Theory and Methodology Division

THE KNOWLEDGE GAP:
AN ANALYTICAL REVIEW OF MEDIA EFFECTS

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THE KNOWLEDGE GAP: AN ANALYTICAL REVIEW OF MEDIA EFFECTS

Two of the earliest findings in the mass communication literature are that some portions of the public tend to be chronically uninformed and that, in general, the greater the level of education, the greater the knowledge of various topics. Introduction of a formal knowledge gap hypothesis has stimulated much recent research and comment about the implications of support for this hypothesis.[1]

Research on knowledge differentials based on levels of education has had two consequences in particular. One is that strong positive relationships between level of education and knowledge are accepted almost as axiomatic by social scientists. The other is that the idea of knowledge gaps based on differences in formal schooling is controversial. Some researchers believe that focusing on education as a variable implies that less educated persons are "deficient" in abilities or "inferior" to more educated persons, and these researchers have desired to shift emphasis to other variables. Concomitant with this trend has been the abatement of interest of many social scientists in studying social problems of the disadvantaged. This abatement parallels the decline in government's interest in social programs.

Study of knowledge gaps is controversial because ideology is implied in the choice of research problems, how research is conducted, and how findings are interpreted.[2] Social research findings are often translated into social policy.

The knowledge gap hypothesis states (Tichenor, Donohue, and Olien, 1970:159-60):

> As the infusion of mass media information into a social system increases, segments of the population with higher socioeconomic status tend to acquire this information at a faster rate than the lower status segments, so that the gap in knowledge between these segments tends to increase rather than decrease.
>
> Predictions are made for both one-time and multiple measurements:
>
> 1. Over time, acquisition of knowledge of a heavily publicized topic will proceed at a faster rate among better educated persons than among those with less education; and
>
> 2. At a given point in time, there should be a higher correlation between acquisition of knowledge and education for topics highly publicized in the media than for topics less highly publicized. (p. 165)

The purpose of this paper is to examine research evidence about knowledge gaps and to ask how strong the evidence is for knowledge gaps associated with education differences, particularly when amount of mass media publicity is taken into account.

Three variables are described by the knowledge gap hypothesis: level of mass media publicity in a particular social setting, level of individuals' education, and level of individuals' knowledge. A review of the evidence for relationships among these three variables follows. This review briefly notes the state of the public's knowledge in the past, and it describes early social science findings about education-knowledge relationships under the influence of media publicity. It includes many news diffusion studies and data from public opinion polls because news diffusion and poll results often are cited as evidence of knowledge gaps or the lack of gaps. A number of studies specifically designed to test hypotheses about knowledge gaps are described.

Many varying characteristics of these studies are analyzed in three

tables. The tables include 58 studies with relevant data. Theoretical and methodological differences among the studies are pointed out, and some conclusions are drawn about media effects on knowledge disparities and conditions under which knowledge gaps may occur or may not occur. Some reasons for conflicting results in the literature are explained, and suggestions are made for future research on knowledge differentials.

BACKGROUND DESCRIPTION OF THE STUDIES

This section briefly describes the kinds of research which led to development of the knowledge gap hypothesis.

Historical Perspective

Illiteracy was rampant in the last century in the United States (Bagdikian, 1971), as it was in many parts of the world. By 1900 the rate of adult illiteracy measured by the U. S. Census was reduced to 10.7 percent, and by 1969 it had declined to one percent, although the disparity between whites and other racial groups was still disproportionate (Wick, 1980).

Knowledge gaps therefore have declined greatly in modern times, but they are far from being eliminated. Not only are one-fifth of American adults deficient in the ability to read, write, and compute tasks necessary for daily life (Copperman, 1980), but also large proportions are often unaware of public affairs events and issues. This lack of awareness limits their capacity to participate effectively in decision-making processes. An informed citizenry is a fundamental assumption in a democracy (Smith, 1975; Suominen, 1976; Tichenor, Donohue, and Olien, 1970).

Information Diffusion: Early Studies

Results of a number of public opinion polls led Hyman and Sheatsley (1947) to discuss the nature of the problems that make it difficult to inform

certain segments of the public, and they called for research on these "chronic know-nothings."

Despite voluminous amounts of information disseminated in a six-month-long information campaign about the United Nations in Cincinnati, Star and Hughes (1950) reported that the number of persons who knew anything about the U.N. was disappointingly low and that the more educated were far more likely to have been reached by the campaign than the less educated.

During the 1948 Presidential election campaign in Elmira, New York, those who knew very much about candidates' stands on issues were much more likely to have high education than low education (Berelson, Lazarsfeld, and McPhee, 1954).

Bogart (1950-51) studied news in "Westerntown" of a young local girl's appearance on a national radio music program and also found knowledge differentials according to amount of schooling.

Diffusion of news of the death of Senator Robert A. Taft ("Mr. Republican") within two contrasting housing projects was studied in Seattle (Larsen and Hill, 1954). At the time of interview, more respondents among a laboring community (93 percent) had heard the news than among a faculty community (88 percent), a "reverse gap" in which the less educated are more likely to know than the more educated.[3]

The widespread but apparently inaccurate belief that a windshield-pitting epidemic had struck Seattle was investigated by Medalia and Larsen (1958). Those among the 7.4 percent who had never heard of this event tended to be elderly, female,[4] non-car owners, and less educated.

A small disparity in knowledge between more and less educated respondents occurred for six samples surveyed on three issues (Deutschmann and Danielson, 1960).

In contrast to these studies are those of the assassination of President John F. Kennedy, an event of astounding impact on the nation and unusual in the enormous, concentrated, and simultaneous focus of all media on the event. Under these conditions, all respondents contacted received the news (Greenberg, 1964), a finding confirmed by six other studies of the same event.[5] However, when Spitzer and Denzin (1965) examined detailed knowledge of the assassination, respondents who were not well informed were characterized by being in blue-collar occupations, living in low-income residential areas, being older, and being male. Spitzer and Denzin, intrigued by Hyman's and Sheatsley's article, reviewed five other studies which supported a "'know-nothing' hypothesis."[6]

Awareness of the Kennedy assassination was compared with awareness of five other assassinations of public figures (Levy, 1969). All respondents knew of the deaths of President Kennedy, Senator Robert Kennedy, and the Rev. Martin Luther King. In contrast, those with more education were considerably more likely to know of the violent deaths of Malcolm X, Medgar Evers, and George Lincoln Rockwell than were the less educated.[7]

For two other types of events, differing in importance, the higher the education, the more rapidly respondents learned of the event (Budd, MacLean, and Barnes, 1966). Similar findings developed in the work of Allen and Colfax (1968), Adams, Mullen, and Wilson (1969), and McNelly, Rush, and Bishop (1968). An opposing finding is Fathi's (1973) result that more of the least educated in his Calgary, Canada, sample had learned of the marriage of Prime Minister Trudeau by the evening of the day it was announced, when compared with more educated persons.

Public Opinion Poll Data

Public opinion poll data tend to exhibit a positive association between knowledge and education. For example, data on a variety of topics which are broken down by education and/or occupation in 26 questions indicate a knowledge gap between higher and lower SES groups (Erskine, 1962, 1963a-c). Six of these questions repeated at two or more points in time demonstrate mixed results on change in the gap over time. Data for two questions showed a slight gap increase, data for three more indicated a slight decrease, and data for another evidenced no change. Results from six additional one-time questions imply little or no gap because either (1) 95 percent or more of the sample knew of the subject or (2) comparisons made between labor union families and the general public showed the union families more knowledgeable about labor-related topics.

The pattern of positive relationships between knowledge and education emerged as well in a review by Wade and Schramm (1969) and in poll results on fluoridation (Gallup, 1977; Douglass and Stacey, 1972). Robinson's (1967:24) inspection of other poll data led him to conclude that "expecting to raise public information levels through mass media efforts would be naive." Additional data and literature review reinforced this point (Robinson, 1972).

Knowledge Gap Studies

Tichenor, Donohue, and Olien presented a formal knowledge gap hypothesis in 1970. Four pieces of evidence supported it: (1) the findings of the news diffusion study by Budd, MacLean, and Barnes (1966), (2) public opinion poll data on three science topics, (3) results of a study contrasting a community with a newspaper strike with a non-strike community (Samuelson, 1960), and (4) the authors' 1968 research in two Minnesota cities, measuring recall of

medical, biological, and social science topics in the news, and comparing recall by previous amounts of newspaper publicity given to these subjects.

Later work by this research team has expanded on conditions under which the gap may widen or narrow with regard to a number of issues in Minnesota communities (Tichenor, Rodenkirchen, Olien, and Donohue, 1973; Donohue, Tichenor, and Olien, 1975; Tichenor, Donohue, and Olien, 1980).[8] Their work has influenced at least fourteen other investigations of knowledge gap phenomena,[9] and it has stimulated several critical essays.

Not all of these studies of knowledge gaps systematically vary levels of media publicity. As the knowledge gap hypothesis is stated, its test requires comparison of high and low levels of media attention to topics.

Among investigations of the impact of high levels of publicity are the studies of Bailey (1971), who confirmed presence of a knowledge gap about Earth Day, and of Abbott (1978), whose work indicates that a year-long energy information campaign did not appreciably change an initial gap in knowledge if respondents had seen one or more newspaper articles on the subject. The gap did increase for respondents not reporting exposure to the articles.

A community with an extensive cardiovascular disease prevention program was contrasted with a similar community without a campaign, and results showed that an initial gap had closed in the treatment community by the third time of measurement (Brown, Ettema, and Luepker, 1981).[10]

A gap in factual knowledge (names, dates, etc.) of two issues decreased during a ten-day period in a Michigan study, a small gap increased for structural knowledge (relationships, reasons) of one event, and a moderate gap in structural knowledge of another did not change (Genova and Greenberg, 1979).[11]

The more that respondents were dependent upon newspapers for news in another study, the greater the gap between more and less educated groups; however, the gap was modest (Fry, 1979). Being dependent on television news made virtually no difference in the small gaps between high and low education groups.

Neuman (1976) observed only a minute gap in some types of news recall and a "reverse gap" in another when he interviewed viewers of evening television network news broadcasts. (Non-viewers were discarded from the survey.)

Exposure to newspaper articles relying on established news sources produced moderate gaps in knowledge of urban respondents, but exposure to articles making more use of non-establishment sources made an impact on knowledge levels of rural respondents, regardless of education levels, in a Minnesota survey (Nnaemeka, 1976).

High levels of publicity in free-distribution neighborhood newspapers appeared to reduce knowledge disparities in a Minneapolis inner-city neighborhood, when neighborhood paper publicity varied for four local issues (Gaziano, 1982).

Three investigations in developing countries have produced varied results under differing conditions. Gunaratne (1976) developed SES measures appropriate for a Sri Lanka sample and found gaps for five topics. Comparison of two of these subjects with earlier data (Ryan, 1952) suggested an increasing gap.[12] Two other surveys employed other SES measurements and focused on agricultural information in media forums for peasant farmers in India: over time Galloway (1977) reported SES-related gaps tending to lessen, and Shingi and Mody (1976) detected no SES-linked differentials either before or after teleclub programs.

Other Supporting Data

Additional studies with data on knowledge differentials related to education level in a variety of U.S. and foreign settings are summarized in tables 1-3 and described in the Analysis section.

Another related group of studies may be mentioned briefly, pertaining to disadvantaged children. These studies are relevant to this analysis, but are not included in the tables. They include the Coleman Report (1966) on school achievement differences and the Bogatz and Ball reports (1970, 1972) on the effects of the educational television program, "Sesame Street." Cook, et al (1975) criticized the latter work because of errors of measurement and statistical inference and suggested that the show helped to widen the achievement gap between advantaged and disadvantaged children. Liebert (1976) has also taken issue with the Bogatz and Ball effort for not being designed to measure closure of any achievement gaps.[13]

Critical Comment on the Knowledge Gap Hypothesis

Since gaps do not always occur or increase, several scholars have discussed potential reasons for conflicting results (Ettema and Kline, 1977; Brown, et al, 1981), and several have attempted to specify conditions under which gaps may develop or change (Katzman, 1974; Ettema and Kline; the Tichenor-Donohue-Olien team, 1973, 1975, 1980).

Genova and Greenberg (1979) suggested reformulating the original hypothesis as a proposition about gaps based on differences in interest, not education. Ettema and Kline proposed a reformulation based on differences in motivation. These might be treated as alternative hypotheses, however, because education, motivation, and interest all could explain knowledge

disparities. Also, their influences might vary under certain conditions, and education might sometimes be related to motivation and interest. For example, one study did find that interest in four topics varied according to education (Gaziano, unpublished data from dissertation in progress).

It is actually a "communication effects gap," some have suggested (i.e., see Rogers, 1976). Evidence that the gap is more than an information gap or a communication effects gap is presented in the discussion section of this paper. This evidence derives from study of the stratification of society, including media and other information delivery systems.

Clarke and Kline (1974) have expressed concern about research relating knowledge to education because resources and policy would be directed toward the school system, rather than toward mass media in attempts to reduce knowledge differentials.

Dervin (1980) contends that the large body of support for the knowledge gap hypothesis buttresses the proposition only because of its underlying model of a source pitching messages to a receiver, who either catches the message or misses it and is to blame if the message is fumbled.[14] She argues that the knowledge gap is not a "real" phenomenon, however, because of difficulties with the traditional source-receiver model, which measures the receiver of messages against irrelevant standards set up by academicians. She faults the logical positivist philosophy behind the traditional model and favors instead the relativist model in social science which underlies "information-seeking" and "uses and gratifications" perspectives. Researchers working within these orientations start with messages as seen from the standpoint of receivers' needs.

ANALYSIS OF KNOWLEDGE GAP DATA

This analysis includes all of the studies that could be located, including both published and unpublished works, which contain any data on relationships of education and knowledge, regardless of the original investigators' interests. Indexes consulted included the Readers' Guide, the International Index, Urban Affairs Abstracts, Communication Abstracts, Journalism Abstracts, Psychological Abstracts, and the Social Science Citation Index. In addition, the footnotes and references of articles and chapters found were checked for further studies.[15]

The conclusions about knowledge gap evidence presented in Table 3 are not necessarily those of the primary researchers. The unit of analysis is "the finding," that is, the finding of a knowledge gap or lack of one at one point in time, or the finding of change or no change over time (see last column in Table 3). Several studies reported more than one finding.

Identification of Key Characteristics

As many pertinent qualities as possible were identified and treated as variables in constructing the table. These characteristics include: date and location of research, sample size, completion rate, type of population sampled, research design (according to criteria outlined by Campbell and Stanley, 1963), number of measurements in time, and method of data collection. Also included are type of topic studied, type of knowledge measured (awareness or depth), operational definitions of knowledge, type of media studied, operational definitions of education and of knowledge gap, an assessment of the amount of media publicity involved wherever possible, and knowledge gap findings (education-knowledge data).

Methodological concerns such as method of data collection, sample sizes, completion rates, and number of measurements aid in determination of how well the populations are represented in these studies. Consideration of dates and locations of research, types of populations studied, and topics permits some conclusions about the generalizability of findings. Comparisons of measurements of knowledge, media, education, and knowledge gaps give insight into similarities and differences, both conceptually and methodologically, and facilitate conclusions about whether or not these research efforts are dealing with the same phenomenon or with different things. This type of analysis also allows identification of useful intervening variables and helps to explain apparently contradictory findings.

Findings are discussed first according to the individual classifications in the tables and then according to support for the knowledge gap hypothesis.

Research Date, Location, and Population

The predominance of knowledge gap findings across varying settings (including several other countries), populations, and a period of about 35 years, indicates that the findings are fairly well generalizable to present-day U.S. populations and some foreign ones. Date, location and population do not seem to help to explain gaps.

Sample Size, Completion Rate, and Design

Knowledge gap findings persist in both methodologically weak and strong studies. Many studies have small sample sizes, although some are quite large; a number of surveys either have low completion rates or did not report them. Some studies report knowledge-education data for a small proportion of the sample because of low response rates or because of theoretical interest in a small part of the sample, such as only television news

viewers. These studies are not easily compared with those reporting data for most of the sample.

Most of the 58 surveys are one-shot case studies, and many of these do not have even a comparison group. One-time measurements do not allow assessment of causal influences of media. Results favor existence of knowledge disparities relatively consistently.

In contrast, studies collecting data at more than one point in time tend to find that gaps decreased or did not change over time if they existed initially. This occurs regardless of design or size of time interval between measurements. However, these studies tend to have certain other characteristics which may explain declines in gaps.

Method of Data Collection

No conclusions can be drawn about method of data collection (Table 2), although reports in which narrowing, unchanging, or no gaps occur tend to have used in-person interviewing techniques.

Type of Topic

Examination of topic studied does suggest several conditions under which gaps develop or change.

First, gaps are likely to occur when topics appeal more to high SES persons than to low SES individuals (Bailey, 1971; Bogart, 1950-51; Wade and Schramm, 1969). When the topic is of specific interest to the less educated, they may be as likely as the more advantaged to possess information (Erskine, 1962, 1963a; Neuman, 1976; Genova and Greenberg, 1979). Also, within an occupational group, communication variables related to employment or organization membership may affect knowledge more than education level (Buss and Hofstetter, 1981; Scherer, 1977).

Second, every study on international or foreign topics included in this analysis reported SES-related knowledge gaps (Budd, et al; Erskine, 1962, 1963b; Gunaratne; McNelly and Molina, 1972; McNelly, et al, 1968; Robinson, 1967, 1972; Star and Hughes, 1950).

Third, gaps frequently develop when national topics are studied (Allen and Colfax; Budd, et al; Hofstetter, et al, 1978; Deutschmann and Danielson, 1960; Edelstein, 1973; Kraus, et al, 1963; Erskine, 1962, 1963a; Atkin, et al, 1976; McNelly and Deutschmann, 1963; Kent and Rush, 1976; Gunaratne, 1976; Clarke and Kline, 1974; Robinson, 1972).

Fourth, whether or not topics are local may make a difference. Education was a strong predictor of knowledge of national issues in the work of Palmgreen (1979), but it was of little or no use in predicting local issue knowledge. The relationship between education and knowledge was stronger for national issues and weaker for local issues, according to Becker and Whitney (1980). And the Tichenor-Donohue-Olien team has noted that when a local issue is of basic concern to a community, the knowledge gap will decline (1975, 1980). Even though knowledge gaps were found for four local issues in a study emphasizing issues of potential importance to residents of an inner-city neighborhood, all the gaps were relatively modest in magnitude (Gaziano, 1982). The evidence to date, therefore, indicates that knowledge gaps are likely to be found when national or international issues are studied, but that gaps may not occur or are small when local issues are of interest.

Fifth, when knowledge is conceptualized as public affairs topics in civics class or textbook terms, knowledge differentials related to educational level are almost always found (Becker and Whitney; Rogers, 1965-66; Fry, 1978; Gunaratne; Atkin, et al, 1976; Kanervo, 1979; Wade and Schramm; Erskine).

Sixth, although people of all educational backgrounds tend to be highly interested in health matters, they may still exhibit knowledge disparities (Erskine, 1963a; Tichenor-Donohue-Olien, 1970, 1980; Gallup; Douglass and Stacey). Nevertheless, an extensive information campaign on good cardiovascular health did tend to close an initial knowledge gap over time (Brown, et al, 1981).

Operational Definitions of Knowledge

Another explanation for inconsistent findings in the diffusion studies is the way in which knowledge is measured. Examples are Fathi (1973) and Larsen and Hill (1954) which report less-educated respondents to be more likely to have information than more-educated members of the sample. This conflicts with the findings of Budd, et al (1966); Adams, et al (1969); McNelly, et al (1968); Deutschmann and Danielson (1960); and Allen and Colfax (1968). The reason for the variation in results is likely to be that knowledge was measured as of the time of interview, or by the evening of the day news was announced. Had interviewing taken place later, results might have been different. In addition, the gap in time of interviewing of the two communities and the newspaper strike also probably affected the findings of Larsen and Hill. Diffusion studies in which interviewing took place some time after the event have found knowledge disparities among education groups (Bogart, 1950-51; Levy, 1969; Medalia and Larsen, 1958). The major exceptions to this finding are the studies by Greenberg (1964) and others (see footnote 5) on the assassination of President Kennedy which established that all respondents were aware of the event. The unusual features of this event were simultaneous, sustained media coverage and great national importance. However, SES-linked differentials in depth knowledge of this event did emerge in one study (Spitzer and Denzin, 1965).

A second consideration in measurement of knowledge is that using open-ended questions which allow respondents to define topics in their own terms does not necessarily lead to findings of no knowledge gaps (Edelstein; Benton and Frazier, 1976; Gaziano; Clarke and Kline; Palmgreen). The only study to use this technique and report little or no effect of formal schooling on knowledge is Palmgreen's, and this occurred only for local issues. However, Edelstein did state that he believed this method reduced knowledge differentials in his study. Also, all correlations for education and knowledge noted in the other four investigations using open-ended questions are moderate.

A third consideration is that using the same measurement of knowledge over time affects findings. Studies in which knowledge questions were identical or the amount of knowledge measured was the same at each time period have tended to find either no change in gaps (Abbott, 1978; Star and Hughes, 1950; Bogart, 1957-58) or narrowing gaps (Galloway, 1977; Bailey, 1971). One reported no gaps at either sampling period (Shingi and Mody, 1976). However, responses to the same poll questions over time were quite variable: responses to five questions showed increases (Tichenor, Donohue, and Olien, 1970; Erskine, 1963c), three demonstrated decreases (Erskine, 1963a-c), one gap remained unchanged (Erskine, 1963c), and one could not be evaluated because the breakdowns into education groups differed (Douglass and Stacy, 1968, compared with Gallup, 1977). In two cases it is not clear whether or not questions were the same at each time of measurement (Brown, et al, 1981; Douglas, et al, 1970), and in one case, two of six items remained the same (Genova and Greenberg, 1979). Among studies with time-trend data the tendency is to indicate unchanging or narrowing gaps;

however, the reason for these findings may be ceiling effects as a result of limiting the amount of knowledge to be measured. The most knowledgeable could advance no further, and those who were less knowledgeable could then "catch up." Three additional studies measured knowledge by different questions over time or else measured any accurate statement as possession of knowledge, but whether or not gaps changed is not clear in two studies (Becker, et al, 1978; Miller and MacKuen, 1979). In the third study, the on-going one of Tichenor-Donohue-Olien (1973, 1975, 1980), gaps tend to narrow over time, but the explanation is that certain conditions were operating (presence of conflict, etc., see p. 21 for complete list).

Types of Media Studied

Scrutiny of media measured also permits better understanding of conditions under which knowledge disparities may be reduced. It may be, for instance, that when a newspaper emphasizes a particular topic over a long period of time, its readers are more likely to know about that subject, regardless of education level -- that is, that readers with grade school educations have more knowledge than non-readers with grade-school level educations, etc. (Brinton and McKown, 1961; Abbott, 1978). The work of the Tichenor-Donohue-Olien team (1973) also indicates that high levels of newspaper coverage of local issues served to narrow gaps. High levels of neighborhood newspaper coverage contributed to reduced gaps (Gaziano). It is also possible that greater reliance by newspapers on established sources of news has some effect in widening knowledge gaps and greater reliance on non-established sources may reduce gaps, although urban-rural differences may be the explanatory variable (Nnaemeka, 1976).

Second, television may be a knowledge-leveler. Findings from two field surveys of network news support this assumption (Neuman, 1976; Gantz, 1978), although a laboratory experiment with a network news show did not (Stauffer, et al, 1978).[16] Further, although better-educated people tend to watch televised Presidential election debates, less educated persons who attend to the debates showed knowledge gains, which may be comparable to the gains of the more highly educated who watch (Miller and MacKuen, 1979; Becker, et al, 1978). Though a third survey of the 1976 debates turned up a moderate knowledge gap, this survey did not measure information gain per se (Bishop, et al, 1978).[17] The introduction of television into rural Norwegian provinces may have increased levels of recognition of national political leaders' pictures (Torsvik, 1972, cited by Ettema and Kline). In a developing country, television forums may have reduced knowledge disparities (Galloway).

Less is known about the influence of interpersonal contacts. High levels of discussion about local issues may tend to lessen gaps (Tichenor, Donohue, and Olien, 1980), but greater reliance on interpersonal news sources which may be less accurate than media may depress knowledge levels (Spitzer and Denzin).

The withdrawal of media, such as a newspaper strike, may contribute to gaps (Samuelson, cited by Tichenor, Donohue, and Olien, 1970). Waning public attention to issues over time may decrease disparities as overall levels of knowledge dissipate (Tichenor-Donohue-Olien, 1975, 1980).

In contrast, the concerted focus of several media on any event may raise knowledge levels of all educational groups. This was especially clear in the case of a president's assassination (Levy, 1969; Greenberg, 1964).

It is possible that the three assassinations of public figures recalled by all of Levy's sample received far more media play than the three assassinations which were less well-remembered. One information campaign decreased knowledge disparities between more and less educated persons (Brown, Ettema, and Luepker, 1981), although three other campaigns essentially had no effects on knowledge differentials (Star and Hughes, 1950; Abbott, 1978; Bogart, 1957-58). Another campaign led to change of a community's attitudes in the intended direction, but did not affect knowledge levels (Douglas, Westley, and Chaffee, 1970).[18]

Measurement of Education

The operational definitions of education levels are impossible to assess because only four studies give information about exact measurement.[19] One of these apparently treated education as a continuous variable although it was coded as six categories (Genova and Greenberg). Two other surveys both coded and analyzed education data as categories (Kent and Rush; Nnaemeka). Only one study is known to have measured education as a true continuous variable (Kanervo).[20]

Operational Definition of Knowledge Gap

The main ways of measuring knowledge gap were: (1) differences in mean knowledge scores between the high/highest education group and the low/lowest education group, computed by subtraction or by analysis of variance, (2) differences in proportions of two or more education groups with any knowledge of the topics, computed by subtraction or by chi square analysis, and (3) correlation coefficients for education and knowledge. Other indicators were path coefficients in path analysis, betas in regression analysis, and comparison of high-SES communities with low-SES communities.

ASSESSMENT OF KNOWLEDGE GAP EVIDENCE

The knowledge gap hypothesis states that as the amount of mass media publicity increases, high SES individuals will acquire knowledge at a greater rate than low SES persons, so that the gap in knowledge between social strata tends to increase rather than decrease. Support for the hypothesis from data for a single point in time and from several points in time will be examined separately.

One Time Measurement

Because the studies vary greatly in media measurement characteristics and in information given about amount of publicity, division of the studies into categories according to more and less relationship between amount of coverage and knowledge gaps can be only a rough assessment. Most of the topics studied appear to have been either moderately well or highly publicized.

Knowledge gap findings occur in the overwhelming majority of one-shot case studies (36 out of 47 reports, including three not located in time for inclusion in the tables, Adoni and Cohen, 1978; Katz, Adoni, and Parness, 1977; Bultena, Rogers, and Conner, 1978, see footnote 20).

Five surveys reporting gaps in addition to the 36 just mentioned require some qualifications in explaining their findings. First, Palmgreen (1979) noted that knowledge gaps developed for national issues but not for local ones. Second, Nnaemeka (1976) found gaps among urban respondents (who tended to read newspapers relying on established news sources) but no gaps or reverse gaps among rural respondents (whose newspapers relied on non-establishment news sources more than did the urban papers). Third, Levy (1969) contrasted awareness of six assassinations of public figures and found

gaps for knowledge of three (which may have received only moderate publicity) as well as no gaps for the other three (which may have attracted more coverage). Fourth, the Tichenor-Donohue-Olien team did find a gap in knowledge of breakfast cereal nutrition but also tended to find declining gaps under the conditions of (a) high levels of conflict associated with issues, (b) high levels of newspaper coverage (1973); (c) high levels of personal discussion (1980); (d) homogeneous social structure of community as opposed to heterogeneous structure, (e) high level of basic concern of issue to a community, and (f) waning levels of public attention to issues over time (1975). Fifth, high levels of activity on issues by organized groups were related to larger knowledge gaps for local issues than were comparatively lower levels of group activity in an inner-city neighborhood (Gaziano, 1982). If greater organized activity implies greater conflict, then conflict did not contribute to narrowed gaps, based on one-time measurement; however, the sample was very different from the Tichenor-Donohue-Olien samples. Organizations' information strategies may have played a role in dissemination of knowledge about the four local issues studied. Nevertheless, distributing information more widely does not necessarily mean equalization of knowledge -- the least educated members of the sample were more knowledgeable about the two issues for which knowledge gaps were greater (although these two gaps were moderate and the other two were even smaller).

Three of the one-time case studies demonstrated "reverse gaps" in which the less educated were more knowledgeable than the more educated; however, the explanation for two of these is probably that time of interview influenced results, as discussed under "Operational Definitions of Knowledge" for Fathi (1973) and Larsen and Hill (1954). A third report of reverse

gaps was a survey of an occupational group in which variables related to being employed versus unemployment seemed to be more related to knowledge than was education level (Buss and Hofstetter, 1981).

Three one-time case studies report either no gaps or negligible gaps. One is that of Deutschmann (1963) who contrasted literate and illiterate Colombian respondents (not differentiated by education) and found no knowledge differences between the two groups. The other two surveys are those of Neuman (1976) and Gantz (1978), both of which report only on individuals who watched the evening television news. This is about 14 percent of Gantz's total sample (it is unclear what percentage of Neuman's sample is included in his data, although the respondents comprised 75 percent of news-viewing households in the sample). Both of the latter studies concentrated only on a small proportion of the total sample and therefore are not directly comparable to the other knowledge gap studies. Two reports (of three surveys) in Israel did note gaps in radio and television news item recall (Adoni and Cohen, 1978; Katz, Adoni, and Parness, 1977 -- not shown in the tables); however, what proportion of the total sample they represent is not known (it is not clear either whether or not they are random samples).

When media publicity in these 47 one-shot case studies is scrutinized, several generalizations may be made. First, results are mixed for high media coverage situations. Readers of a newspaper covering the fluoridation issue heavily knew more about that issue than did non-readers, regardless of educational level (Brinton and McKown, 1961). High newspaper coverage led to reduced gaps in local issue knowledge (Tichenor-Donohue-Olien team, 1973). When media publicity is high, sustained, and concentrated, gaps in awareness knowledge may close or be non-existent (Greenberg, 1964; Levy, 1969; Erskine, 1962, 1963a-c). However, even if media attention is highly focused on an issue for some time, SES-related gaps may be observed in depth

knowledge (Spitzer and Denzin, 1965). Further, some surveys of highly covered issues and events report gaps, but these tend to be either medical, biological, and social science topics (Tichenor, Donohue, and Olien, 1970) or national or international topics (Edelstein, 1973; Erskine; Douglass and Stacey, 1972; Berelson, Lazarsfeld, and McPhee, 1954). Other surveys of relatively well-publicized national subjects find modest gaps (Deutschmann and Danielson, 1960; Clarke and Kline, 1974; Bishop, Oldendick, and Tuchfarber, 1978; Genova and Greenberg, 1979).

Second, results are mixed for low publicity situations. Withdrawal of a daily newspaper because of a strike was linked to increased knowledge gaps (Samuelson, 1960). Decline in media attention to local issues over time was associated with reduced gaps (Tichenor-Donohue-Olien, 1975). When amount of media coverage and geographical scope of issue were varied, amount of media attention did not contribute to gaps but scope did -- gaps developed for national issues but not local ones (Palmgreen, 1979). In a study varying amount of neighborhood newspaper publicity for four local issues, higher coverage was associated with smaller knowledge gaps when compared with gaps for issues receiving less publicity (Gaziano, 1982). When dependence on a particular medium varied and media attention was low, the strength of the relationship between education and knowledge was weak or non-existent for local topics and stronger for national ones (Becker and Whitney, 1980). In a field experiment, the more publicized the news stories on medical, biological, and social science topics, the larger the knowledge gap when compared with recall of less publicized articles on these subjects (Tichenor, Donohue, and Olien, 1970).

When media exposure and non-exposure are contrasted, some evidence suggests that media exposure leads to knowledge gap reductions. In Peru and Venezuela, degree of media exposure was a stronger predictor of foreign affairs

or public affairs knowledge of low SES respondents than was level of education (McNelly and Molina, 1968; Kanervo, 1979), and in Colombian peasant villages, media use or exposure contributed to public affairs knowledge (Rogers, 1965-66; Deutschmann, 1963). Among a national U.S. sample, media use was highly associated with political information increases, especially for low and medium education respondents (Hofstetter, Zukin, and Buss, 1978). In contrast, a gap in knowledge of the radioactive nuclear fallout issue occurred regardless of amount of total media exposure in another U.S. investigation (Kraus, Mehling, and El-Assal, 1963). Exposure to televised news may have led to narrowed gaps in two studies, although non-exposure was not studied (Neuman, 1976; Gantz, 1978); but gaps were found in an experimental study (Stauffer, Frost, and Rybolt, 1978) and in three Israeli investigations (Adoni and Cohen, 1978; Katz, Adoni, and Parness, 1977). Limitations of studies of television viewers for comparison with those discussed previously have already been noted.

When media are viewed in terms of media dependence, Fry (1979) examined the same data as Becker and Whitney (1980) and concluded that the higher the dependence on newspapers, the greater the knowledge gap for public affairs information (not a statistically significant finding). There was no knowledge difference among respondents who were dependent on television. The data of Brinton and McKown (1961) can also be compared in terms of readers versus non-readers: the knowledge gap on the fluoridation isssue among readers is smaller than the gap between non-readers. On the other hand, other data on federal budget deficit and nuclear freeze issues revealed larger gaps among newspaper readers than non-readers (results were mixed for television viewers who evidenced a greater gap on the budget issue when

contrasted with non-viewers; non-viewers showed a greater gap for the nuclear freeze issue).[21]

Summary: Media Effects on Gaps in One-Shot Studies

The overwhelming bulk of the evidence from one-time case studies is for knowledge gaps related to differences in formal education. High and moderate levels of mass media publicity may reduce knowledge gaps, but type of topic and geographic scope of topic may be more important factors in the development and maintenance of gaps, as well as in their reduction. Sheer high levels of mass media coverage alone may not necessarily decrease gaps. Other factors which seem to play a role in narrowing gaps include presence of conflict in issues, homogeneous social structure of communities (which may facilitate communication and consensus on issues), high level of basic concern of issue for a community as a whole, and amount of activity on issues by organized groups. The mere fact of knowledge gap data in one-time case studies does not necessarily mean that media publicity contributed to increased gaps between high and low SES strata in the population. Many of the education-knowledge correlations in the studies discussed above are moderate (an example is a Pearsonian correlation of .24). Such a moderate correlation may instead point to a narrowing of gaps, but one-shot case studies do not permit confident conclusions about either increased or reduced knowledge gaps under the influence of high levels of mass media publicity.

Measurement Over Time

Examination of research measuring knowledge at two or more times helps to shed more light on the relationship, although some questions about operational definitions of knowledge may be raised. Investigations with panels will be discussed first; then surveys utilizing separate samples will be examined.

Among eleven surveys with panels or combinations of panels with other designs, which types of design permit inferences about causality, four indicate a decrease in knowledge inequalities under certain conditions -- in U.S. settings, unless otherwise noted (Brown, Ettema, and Luepker, 1981; Douglas, Westley, and Chaffee, 1970; Galloway, 1976, in a developing country; Genova and Greenberg, 1979). Three show no change in knowledge gaps over time (Star and Hughes, 1950; Bogart, 1957-58, in Greece; Abbott, 1978). One report of no gap at either measurement focused on a teleclub for peasant farmers in a developing country (Shingi and Mody, 1976). Another did not measure knowledge gain over time (Bishop, Oldendick, and Tuchfarber, 1978) and therefore will not be included in the concluding analysis. In addition, the reanalysis of Sesame Street data suggested that learning gaps between advantaged and disadvantaged children increased (Cook, Appleton, Conner, Shaffer, Tankin, and Weber, 1975). It should be noted that the independent variable was not exposure to the children's program but rather "encouragement to view." Another study of Sesame Street which did measure viewing found that learning gaps increased between advantaged and disadvantaged children (Minton, 1972, cited by Liebert, 1976).

Of five reports based on separate samples over time, four indicate reduction in knowledge differences between more and less educated persons in the U.S. under certain conditions (Tichenor-Donohue-Olien team, 1973, 1975, 1980; Miller and MacKuen, 1979; Bailey, 1971; Becker, Sobowale, Cobbey, and Eyal, 1978). A portion of Gunaratne's (1976) data suggested increasing gaps when compared with the data of Ryan (1952), although the limitations of this comparison have been pointed out in footnote 12. Finally, poll questions asked over time produced mixed results of increased knowledge gaps for five topics (Tichenor, Donohue, and Olien, 1970; Erskine, 1963c), three decreases

(Erskine, 1963a-c), and one gap unchanged (Erskine, 1963c).

Summary: Media Effects on Gaps Over Time

Fifteen studies and nine sets of poll data measure knowledge over time and provide data useful to this analysis.

Eleven reports (studies or poll questions) exhibit decreasing gaps. Information about media publicity is not known for the three poll questions. Two of the eight studies involve extensive information campaigns, three relate to high levels of media publicity about a topic (usually local), and two concern televised Presidential election debates. One involves a teleclub for farmers in a developing country.

Eight reports (studies or poll questions) either demonstrate or suggest increasing knowledge gaps over time. Media coverage is not known for the five poll questions. Two of the time trend studies are of Sesame Street, and one survey is a limited comparison of studies twenty years apart in a developing country.

Four reports show no change in gaps between periods of measurement. One of these is a poll question with no media information provided. The three studies concern information campaigns (one on the U.N. in Cincinnati, one on human rights in Greece, and one on energy in Madison, Wisconsin).

It should be pointed out that two time-trend studies and three poll questions may have resulted in findings of decreasing gaps because of ceiling effects since the same questions were asked each time (Erskine, 1962, 1963a-c; Galloway, 1977; Bailey, 1971). Two other studies reporting narrowed gaps may also have used identical questions each time, but this could not be determined for certain in their reports (Brown, Ettema, and Luepker, 1981; Douglas, Westley, and Chaffee, 1970). (All of the three surveys reporting no change in gaps used the same questions each time.)

About two-thirds of the time-trend evidence does not support a hypothesis of increasing gaps with higher levels of media publicity. Instead, the evidence favors decreases in gaps or no change when media attention is high. However, several strong notes of caution should be heeded. First, ceiling effects may be confounding the findings of decreased gaps. Second, type of topic and geographic scope of topic play a very important role in narrowing knowledge differentials. Third, several special conditions seem to influence findings of reduced gaps, such as presence of conflict in issues, high level of organized group activity on issues, individuals' motivation or interest, and type of community social structure.

DISCUSSION AND CONCLUSIONS

The majority of the 58 reports examined support the proposition that the higher the education, the greater the knowledge of various topics. This is not the same thing as described in the knowledge gap hypothesis, which requires a comparison of varying levels of mass media publicity for topics.

It is important to distinguish between knowledge gaps found in surveys taken at one point in time and knowledge gaps discovered in studies taking measurements at several points in time.

In one-time case studies, the frequent finding of moderately sized gaps may indicate that media publicity played a part in decreasing initially larger gaps. However, no firm conclusions can be drawn about the effect of high versus low levels of media coverage in one-shot studies.

The time-trend studies, taken as a whole, suggest that increasing levels of media publicity may reduce gaps but several other factors may be equally or more influential in narrowing gaps. These include measurement of knowledge with identical questions pre- and posttest which would produce a ceiling

effect and therefore a competing explanation for decreased gaps. Other important characteristics are type of topic, geographic scope of topic, and certain conditions which have been discussed in several of the preceding sections of this paper.

The most frequent characteristics associated with knowledge inequalities in either one-time or time-trend surveys seem to be type of topic and geographic scope of topic studied. Content areas related to gaps include international and national issues, topics of greater interest to high-SES persons than to low-SES individuals, and knowledge conceptualized in civics-type or textbook terms. Gaps occur less frequently or are small when topics are local and are likely to appeal to lower SES strata.

Inconsistent results in the diffusion studies in which the less educated tend to be more aware of issues than the more educated are most likely to be explained by the operational definition of knowledge as awareness of topic by time of interviewing or by evening of first news announcement. Results might have been different, had interviewing taken place later.

In addition, utilizing open-ended questions which allow respondents to define knowledge in their own terms does not necessarily lead to findings of no differences, but it may lead to findings of smaller gaps than other methodologies.

Characteristics of research efforts which do not seem to influence results are populations studied, method of research, date and location of research, and operational definition of knowledge gap.

Whenever studies are compared, one must account for a variety of measurement and conceptual differences and the particular set of conditions under which the findings hold.

Comparability of research findings is a key issue. If results conflict, perhaps different phenomena were measured. Operational definitions of knowledge may be dissimilar (e.g., depth versus awareness knowledge). Even if the type of knowledge is the same, question wording or measurement may differ (i.e., one study may use a set of 16 knowledge items and another may use open-ended questions). Types of media studied may vary, as may measurement of media contact (use, frequency of exposure, ownership, message discrimination, etc.) An additional difficulty is that not only is measurement of education usually not explained, but also there is no "standard" way to measure it.

Proportions of samples being contrasted may vary. Findings based on a small portion of a sample, such as television news viewers, are not comparable to results based on the majority of another sample. A further problem is that many authors do not give information on response rate at all.

Populations may vary. Random samples drawn from telephone listings, registered voters, and peasant farmers may yield differing data because populations were not equivalent. These, in turn, are unlike a purposive sample of adult non-readers. Results based on a comparison of low-SES and high-SES communities are not entirely comparable to findings based on individuals who differ in level of education or other SES indicators.

Finally, complicating factors in comparisons of poll data (even though questions over time are identical) are the order in which questions were asked, the nature of preceding questions, and differences in sampling methods (i.e., early quota samples and later samples when methods were more sophisticated and representative).

Future Considerations for Research

A great deal of empirical evidence for knowledge gaps exists; therefore, we may believe that we know much about gaps under the influence of media publicity. In fact, we do not know much at all. Very little research with data on associations between knowledge and education has involved mass media coverage of issues and news topics as a variable. In particular, little is known about

changes in the education-knowledge relationship over time as media coverage of topics varies.

If scholars are interested in future knowledge gap investigations, they may wish to be guided by several considerations.

First, since little is known of the causal influence of media on knowledge gaps, not only should measurements be taken at more than one point in time, but also panel designs (or panels in combinations with other designs such as the Solomon four-group design) are desirable in order to demonstrate causal influence of media. Conclusions from an analysis of 56 studies of newspaper effects underscore this point (Weaver, 1978).

Second, future knowledge gap research should systematically vary media publicity.

Third, the amount of time which has elapsed between measurements is a variable. Bursts of publicity may reinforce learning from media, but competing information and the forgetting process may intervene to alter knowledge gaps. The amount of media attention to various topics is in a constant process of change, and gaps may continually change over time as well.

Fourth, measurement of knowledge, especially knowledge gain, is fraught with problems. A small pilot study of learning from the 1976 Presidential debates points out a number of such difficulties (Graber, 1978). In addition, scholars may wish to know of the variety of operational definitions of knowledge in past research and to select those which will best answer their research questions. They may desire to avoid textbook types of knowledge definitions, and they may prefer to use open-ended questions so that respondents can define knowledge in their own terms. Also, if statistical analyses assuming interval-level data are desired, researchers will want to

measure knowledge and education as continuous variables (this does not preclude treating them as categorical variables as well). In the same vein, a ten-item test of knowledge at more than one point in time can aid assessment of knowledge gains; however, this limits the knowledge that can be studied. The facts of many issues are complex and, in theory, may have no limit or be so complex that the limit is difficult to achieve. Further, even if results demonstrate a reduction of a knowledge gap for a set of ten items, perhaps the gap increased for other aspects of knowledge of that particular issue. Limiting the knowledge to be acquired to a set of ten specific items may be justified in terms of the goals of a particular information campaign, but in other situations, such as a complicated issue, setting knowledge limits may not be justified or realistic.

Fifth, other variables besides education may affect knowledge gaps and therefore be of interest, but these variables may also be related to differences in education. Level of education has been found to be related to interest (e.g., interest in Presidential debates, Graber, 1978), to opinion-holding (e.g., Schreiber, 1978), and to behavior (e.g., buying of children's books advertised on television, Werner, 1975).

Sixth, since level of education frequently is positively associated with knowledge, some scholars may want to explore this relationship from any of several vantage points. One is explanation of the relationship (e.g., Samuelson, Carter, and Ruggels, 1963; Palmgreen, 1979; Childers with Post, 1975; Tichenor, Donohue, and Olien, 1970). Another is from the view that social-structural variables frequently predict behavior because social processes tend to be relatively stable. But certain situations and events can disrupt these social processes. It is in such cases that media may play a role that is not constrained by social structural variables (Davis, 1977).

Upper-SES strata have access to more information and to more accurate information than do low-SES strata through print media, especially specialized print media, organization memberships, formal schooling, family norms fostering achievement, and high-status personal contacts. Groups often are parts of networks of larger organizations which further enhance opportunities to acquire knowledge. The result is a severely constricted flow of accurate information about public affairs to low-SES groups, a flow that consigns low-SES strata to a more closed information system than that of upper-SES strata. Messages circulating in the lower-SES subsystem tend to concern gossip, rumor, and folklore more often than public affairs topics (Childers with Post, 1975). Much communication to low-SES strata tends to be one-way from mass media or upper-SES strata, and one-way communication can be irrelevant or misinterpreted (Childers with Post).

It is sometimes argued that low-SES persons have a different kind of knowledge than do high-SES persons; however, low-SES knowledge is not necessarily useful for social mobility or advancement of low-SES individuals vis-á-vis the center of power in society. Frequently, it is detrimental from the point of view of providing them with information which they can use to advance their interests. Public affairs knowledge is the kind of knowledge upon which social power is based. Researchers may elect to examine public affairs topics of potential interest to the disadvantaged. Scholars working within an information-seeking framework may want to follow up on the observations of Suominen (1976) and Childers with Post that the disadvantaged may not be able to view their problems in terms of information needs, and when they do seek information, may not be very active in the search.

Further, knowledge differentials depend on how information campaigns and information delivery systems are organized. Health and agricultural diffusion programs in developing nations tend to be set up not to benefit the poor but to serve the well-to-do farmers, landowners, and the government in power (Röling, Ascroft, and Wa Chege, 1976; Rogers, 1976; McAnany, 1978). Diffusion studies which find positive relationships among such variables as knowledge, adoption, income level, educational level, mass media exposure, etc., "have failed to perceive these variables as parts of a broader and more crucial factor: society's power structure" (Beltran, 1975:2:190).

American media also are structured to benefit the upper stratum. Some work has emphasized the stratification of social power and knowledge control mechanisms in the U.S. (Olien, Tichenor, and Donohue, 1982; Tichenor, Donohue, and Olien, 1980). Other work has suggested implications of information redistribution (McNelly, 1973).

Knowledge disparities may be exacerbated by the relatively recent change in the structure of the national economy, which increasingly is based on information allocation (Smith, 1975). In light of this, scholars also may wish to consider Katzman's (1974) hypotheses that new communication technologies may increase knowledge inequalities, not only because of unequal access, but also because of unequal use, especially if access and use are linked to socioeconomic differences.

Scholars may wish to review several policy implications of knowledge gap research in light of the evidence presented in this paper and the suggestions for further research. In cases in which positive associations between education and knowledge are weak, researchers may desire to specify more conditions under which the relationship is attenuated. Perhaps the mass media have greater influence on reduction of knowledge gaps than previously

believed. In situations in which evidence for positive relationships between education and knowledge is substantial, some scholars may wish to consider how such social disparities should be addressed with regard to decisions about research topics, allocation of resources, and formulation of social policy. The shift in research emphasis from the traditional model to other perspectives which de-emphasize SES variables indirectly may be supportive of the Reagan Administration's stance that the less advantaged do not require much support from social programs. To what extent is research presently concentrated on topics linked to social programs? Have social scientists stopped studying social inequalities because the orientation of government has changed?

Scholars interested in knowledge gap research may wish to investigate the complex sets of factors that bound social classes, impede social mobility, and lead to further unequal distribution of knowledge. Creating a more equitable knowledge distribution, assuming that this is a desirable goal in a democratic society, is not just a matter of redistributing information. The knowledge gap is not merely an information gap or a communication effects gap; it is part of a gap between well-bounded social strata, and it reflects disparities in information as one among many resources which are less available to lower SES groups in society.

FOOTNOTES

[1]The author acknowledges the helpful comments and criticisms offered on an earlier version of this paper by Phillip J. Tichenor, Professor of Journalism and Mass Communication, and by P. Jean Frazier, Associate Professor of Health Ecology and Ph.D. student in Mass Communication, both of the University of Minnesota. Acknowledgment is made also of the assistance of Randy Latimer, typist. Any errors are the sole responsibility of the author.

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[2]See Beltran (1975) for one discussion of ideology in research.

[3]However, two factors may have affected this result. One is that a newspaper strike had idled the afternoon paper, a likely news vehicle for the faculty group. Another is that the faculty community was canvassed about a day after the event and the laboring community not interviewed until three and a half days had elapsed after the event.

[4]Although a number of early diffusion studies, polls, and other research tended to find more men than women aware of a topic, this was not always the case, and gender differences seem to have been dependent partly on topic. In more recent research, sex differences in knowledge are not often found.

[5]Besides Greenberg (1964), these studies are:
Mendelsohn, 1964; Sheatsley and Feldman, 1964; Hill and Bonjean, 1964; Spitzer and Spitzer, 1965; Banta, 1964; Burchard, 1964. They are cited in Spitzer and Denzin (1965).

[6]These are Deutschmann and Danielson, 1960; Danielson, 1956 (no knowledge results by education); Larsen and Hill, 1954; Bogart, 1950-51; and Medalia and Larsen, 1958.

[7]A "reverse gap" appears for two events, however, when the sample is divided by race. Non-whites tended on the whole to be less educated than the whites (respective percentages with less than a high school education were 60.6 and 38.3). Non-whites had heard of the deaths of the two black public figures, Malcolm X and Evers, in greater proportions than whites. (More whites than non-whites were aware of the death of Rockwell, a white American Nazi party leader.)

[8]These three research reports deal with an ongoing study. The 1975 and 1980 reports are updates on the 1973 article. In future references the three reports will be termed the work of the Tichenor-Donohue-Olien research team.

[9]Three studies testing knowledge gap hypotheses are not reported in detail here because their content is not as relevant to this analysis as the other studies described. They are: (a) Suzanne Patricia Tainter, Local Media Coverage of Community Issues: Does It Widen the Knowledge Gap?, unpublished master's thesis, University of Wisconsin, 1978; (b) Christopher G. Egueke, Involvement in News Events and the Knowledge Gap Hypothesis, unpublished master's thesis, University of Wisconsin, 1979; and (c) Clifford Wayne Scherer, Differential Knowledge Gain from a Media Campaign: A Field Experiment, unpublished Ph.D. dissertation, University of Wisconsin, 1977, on dairymen.

[10]Brown, et al, also found that gaps in motivation widened. Motivation was measured by age and by perceived risk of cardiovascular disease.

[11]A measure of "composite interest" (self-interest and social interest combined) did about as well as education in predicting factual knowledge, but composite interest was a better predictor of structural knowledge than education was.

[12]Gunaratne's data collected in 1971 and Ryan's data from 1951 are not directly comparable because Ryan's respondents were male heads of households and Gunaratne's respondents were females, male heads of households and male non-household heads. Gunaratne's comparison over time was of Ryan's male household heads and the 1971 data on all males for only two villages and two types of knowledge. Both studies used the same questions on knowledge of Ceylonese national affairs and of mechanical/scientific knowledge. Two items on the scale of international knowledge were updated and are not directly comparable. Two additional areas of knowledge were included in Gunaratne's study but not Ryan's; these are family planning methods and demonetization. Further, Gunaratne excluded one of the three villages in Ryan's study and added two others to his investigation.

[13]Liebert also cites the work of Minton (1972) which showed that the first year of viewing "Sesame Street" led to gains for advantaged children only in the sample. In addition, Salomon (1976:141) discussed an Israeli study which also found SES differences; however, "low SES children. . .learned more in areas of perceptual analysis and discrimination, whereas middle-class children learned more in areas of abstraction and synthesis."

[14]Beltran (1975) makes a distinction that others have also made between "system-blame" and "person-blame." He would not necessarily discard the traditional model, but he would shift his analysis to characteristics of the social system rather than to characteristics of the individual. I would suggest that "blame" is not the point of scientific analysis; rather the goal is to determine causes of phenomena. These causes may not necessarily be "fault."

[15]Other studies with relevant data may well exist but were not found. I would appreciate having any studies with relevant data which have been omitted to be called to my attention.

[16]Since these tables were constructed, two other studies with data on exposure to television and radio news, awareness of news items, and knowledge gaps have been called to my attention. These are: Katz, Adoni, and Parness, 1977; and Adoni and Cohen, 1978. A fuller discussion of these two studies appears under the headings, "Assessment of Knowledge Gap Evidence," "One-Time Measurement."

[17]This survey (Bishop, Oldendick, and Tuchfarber, 1978) states that the "knowledge-rich" got "richer"; however, this assumption is not based on their own data but on Graber's (1978) data on 21 individuals and on a mimeographed report of Alan Abramowitz, "The First Debate: A Study of Attitude Change," Williamsburg, Va., College of William and Mary, 1977. I have not examined the latter report. Graber's pilot study of learning in depth included two persons with a grade school education, six with high school educations, and thirteen with college educations.

The statement, "On the awareness of political issues, watching the presidential debates appeared to widen the existing information gap between the knowledge-rich and the knowledge-poor," appeared on p. 99 of an article by Bishop, et al, in the Journal of Communication 28:4:99-113 (1978), entitled "Debate Watching and the Acquisition of Political Knowledge." This article contains much of the same type of information as does their 1978 book chapter, and the statement appears to be based on the Abramowitz article and Graber's chapter.

[18]There was a slim gain of .41 in the average score of the grade-school educated group, but scores of groups with more education had declined by the end of the campaign.

[19]Some scholars contend that categorical and ordinal data may be treated in statistical analysis as if they were equal interval data. Others argue that considerable error will result if this is done. The reader is referred to two discussions of this problem:

a) Bollen, Kenneth A. and Kenney H. Barb. "Pearson's R and Coarsely Categorized Measures." American Sociological Review 46:232-39 (1981).

b) Hewes, Dean. "'Levels of Measurement' Problem in Communication Research: A Review, Critique, and Partial Solution." Communication Research 5:87-127 (1978).

[20]One study not included in the tables but referred to in the text of this paper apparently coded education as a continuous variable, but what was actually measured was educational level of the household head. This was compared with the respondent's knowledge of the issue, but the respondent was not necessarily the head of the household. The study is Bultena, Rogers, and Conner, 1978 (a knowledge gap for the issue was found).

[21]This information is from a letter to the author from David W. Moore, Associate Professor of Political Science, University of New Hampshire, Durham, N.H., on May 26, 1982. He cited data analyzed by his student, Carolyn Eisenhut, in her paper, "Does a Knowledge Gap Exist in New Hampshire????", May 10, 1982.

TABLE 1: CHARACTERISTICS OF SAMPLES

AUTHORS	DATES OF RESEARCH	LOCATION OF RESEARCH	SAMPLE SIZE*	COMPLETION RATE	POPULATION*	DESIGN*	NO. OF POINTS IN TIME
1. Abbott (1978)	1976-1977	Madison, Wisc.	Approx. 1,220 at T_1; approx. 1,148 at T_2 (treatment & control groups combined)	85% at T_1 80% at T_2 of drawn samples	Readers of morning newspaper	Modification of Solomon 4-group design	2
2. Adams, Mullen & Wilson (1969)	March 28-April 2, 1967	13 metropolitan areas across the country	2,646 (of whom 1,456 or 55% reported hearing of event	Not given	Listings in telephone directories & "other methods"	1-shot case study	1
3. Allen & Colfax (1968)	April 1-3, 1968	Willimantic, Conn.	79 (weighted to = 130)	73% of drawn sample	All households in community (no other information)	1-shot case study	1
4. Atkin, Galloway, & Nayman (1976)	1. Nov. 6, 1972 2. Fall 1972	1. National (SRC**) 2. Cities in Michigan & Colorado	1. 846 (subset of nat. (sample) 2. 148 (Mich.) 171 (Colo.) (not random)	1. Not given 2. Not given	1. Not given (may be registered voters) 2. Undergraduates in communication classes	1. Data from 1 wave of panel 2. Panel (convenience sample)	1. 1 2. 2
5. Bailey (1971)	March 9-10 & April 30-May 1, 1970	Madison, Wisc., & surrounding area	N_1 = 162 (T_1) N_2 = 120 (T_2)	84% for both samples combined	Listings in telephone directory	Separate sample pretest & posttest	2
6. Becker, Sobowale, Cobbey, & Eyal (1978)	Fall 1976 (T_1--pre-debates T_5-election eve)	Onondaga County in upstate New York	N_1 = 104 N_2 = 297 N_3 = 256 N_4 = 427 N_5 = 233	Not given	Registered voters (no other information)	5 waves, separate samples	5
7. Becker & Whitney (1980)	Fall 1977	Franklin County, Ohio (contains Columbus)	548	Not given	Listings in phone directory (household heads, M & F)	1-shot case stuay	1
8. Benton & Frazier (1976)	Jan. 29-Feb. 9, 1975	Minneapolis Minn.	111	53% of drawn sample	Households, area wide sampling	1-shot case study	1
9. Berelson, Lazarsfeld & McPhee (1954)	June-Nov. 1948	Elmira, N.Y.	T_1 : 1029 June T_2 : 881 Aug. T_3 : 814 Oct. T_4 : 944 Nov. (N = 746, all 4 waves)	81% of drawn sample (T_1) 59%, all 4 waves	Dwelling units, area wide sampling methods	4-wave panel	only 1 reported (T_2)
10. Bishop, Oldendick and Tuchfarber (1978)	Fall 1976 T_1: pre-debates T_3: post election	Greater Cincinnati, Ohio	480 panel, 138 control T_2 280 control T_3 (Total: 898)	Not given	Listings in telephone directory	3-wave panel plus 2 posttest only control groups	3 (but knowledge gain not measured)
11. Bogart (1957-58)	Sept.-Oct. 1952 & Jan. 4-11 1953	Salonica, Greece (treatment city) Patras, Greece (comparison city)	Salonica panel 352 T_1, 285 T_2; N_2=794, N_3=254 Patras: 246 T_1, 266 T_2	Not given	Adults listed in files of official identity card holders	Salonica: 2-wave panel + 2 separate samples T_2	2
12. Bogart (1950-51)	approx. 1948 or 49	"Westerntown, a prairie community of 25,000"	200 random sample (plus 68 leaders)	Not given	Listings in telephone directory	1-shot case study	1
13. Brinton & McKown (1961)	approx. 1960	Menlo Park, Cal. (fluoridation not hot topic here but is in nearby Palo Alto)	194	59% of drawn sample	Palo Alto newspaper route lists, nonsubscribers next door (all women)	1-shot case study; readers, non-readers compared	1
14. Brown, Ettema & Luepker (1981)	approx. 1979 or 80 T_1 pre-test T_2 (not reported) T_3 post-test	2 communities in southwestern Minnesota (treatment & comparison)	250 at T_1 (100 panel) + 150 at T_2 + 150 at T_3 (Combined Ns)	Not given Tables show 87 panel in treatment community, 95 comparison cmty.	List of occupied dwellings compiled from phone directory & tax & utility records	3-wave panel plus 2 posttest only control groups	2 reported out of 3 waves

TABLE 1, continued (Characteristics of Samples)

AUTHORS	DATES OF RESEARCH	LOCATION OF RESEARCH	SAMPLE SIZE*	COMPLETION RATE	POPULATION*	DESIGN*	NO. OF POINTS IN TIME
15. Budd, MacLean, & Barnes (1966)	Oct. 15-16, 1964	Iowa City, Iowa	327	62% of drawn sample, but 83% of all contacts	Listings in telephone directory	1-shot case study	1
16. Buss & Hofstetter (1981)	July-Aug. 1978	Youngstown, Ohio (compared with Lordstown, Ohio)	284 steel-workers 80 auto-workers	85% treatment group (steelwkrs) 80% auto-workers	Employees of Youngstown steel plant & Lordstown auto plant.	1-shot case study with comparison group	1
17. Clarke & Kline (1974)	Not given	Ann Arbor, Mich.	137	Not given	Household heads excluding student or faculty areas (no other information)	1-shot case study	1
18. Deutschmann (1963)	Not given	Saucio, Colombia (small village in the Andes	71 (not a sample but a population)	90%	All household heads	1-shot case study	1
19. Deutschmann & Danielson (1960)	Nov. 1957 Lansing:Ike Jan. 1958 Explorer I June 1958 Alaska	Lansing, Mich. (all 3 topics) Madison, Wisc. (Expl., Alaska) Palo Alto (Explorer I)	Respectively: N_1 = 218 (Ike) N_2 = 179 (Explorer) N_3 = 94 (Alaska) N_4 = 133 (Explorer) N_5 = 181 (Alaska) N_6 = 39 (Explorer)	Ranges 67%-85% of drawn samples but about 95% of contacts	Listings in telephone directories	1-shot case studies	1
20. Donohue, Tichenor, & Olien (1975)	1. 1970 & 1972 2. 1969 through 1972	1. 4 northern Minnesota communities 2. 16 Minnesota communities	Ranges from 96 to 131	Not given (see Tichenor et al 1980)	Community households, area wide sampling	1. 2 waves, separate samples 2. 1-shot case studies (comparisons)	1. 2 2. 1
21. Douglas, Westley & Chaffee (1970)	Sept. 1965 & April 1966	Reedsburg, Wisc. (treatment cmty) Richland Center (comparison community)	Reedsburg T_1, 108; T_2, 85 Rich. Ctr., T_1 74; T_2, 60 (approx. figs.)	T_1: 81% of drawn sample, Reedsburg, 44% in R.C.	Households in community on electric power co. utility lists	2-wave panels in treatment & comparison communities.	2
22. Douglass & Stacey (1972)	Spring 1968	National (NORC+)	1,482	Not given	Not given	1-time poll	1
23. Edelstein (1973)	Oct. 1968	Seattle, Wash.	Not clear— 689 or more	Not given	Households in city limits, area wide sampling	1-shot case study	1
24. Erskine (1962, 1963a,b,c)	Late 1960s to 1962	National (several poll organizations)	Not given	Not given	Not given	polls: 1 to 3 waves	1, 2, & 3
25. Fathi (1973)	March 5-7, 1971	Calgary, Canada (population 400,000)	186	74% of drawn sample, 94% of contacts	Listings in telephone directory	1-shot case study	1
26. Fry (1979)	Fall 1977	Columbus, Ohio (same data as Becker & Whitney)	548	Not given	Listings in telephone directory	1-shot case study	1
27. Galloway (1977)	Mid-1964, mid-1966, late 1967	2 villages in Lucknow region, India (treatment & comparison)	192 (treatment & comparison both)	Not given	Peasant farmer household heads	3-wave panels in treatment, comparison villages	3
28. Gallup poll (1977)	Oct. 20-24, 1977	National	1,517	Not given	Not given	1-time poll	1
29. Gantz (1978)	July 1,2,3 and 7-10, 1975 (between 7:15 and 9:30 p.m.)	Lansing, Michigan	243 (293 had viewed the evening news, out of 563 interviewed; 50 discarded because of slightly different questionnaire)	14% (of 4018 numbers selected) (8% refused, 32% had not watched the news, rest had disconnected numbers or were ineligible for various reasons	Listings in Lansing Area Telephone Directory (1975)	1-shot case study	1

TABLE 1, continued (Characteristics of Samples)

AUTHORS	DATES OF RESEARCH	LOCATION OF RESEARCH	SAMPLE SIZE*	COMPLETION RATE	POPULATION*	DESIGN*	NO. OF POINTS IN TIME
30. Gaziano (1982)	Mid-March and first week of April 1980	An inner-city neighborhood in Minneapolis Minn.	239	68% of contacts with eligible members of sample	Households with listed telephone numbers in the neighborhood (Blocks selected at random and households selected within blocks at random)	1-shot case study	1
31. Genova & Greenberg (1979)	Aug. 1974 (2 periods 10 days apart)	15 communities in Greater Lansing, Mich., excluding Lansing proper	253	63% of drawn sample, but higher rate of contacts	Listings in telephone directory	2-wave panel	2
32. Gunaratne (1976 approx.)	1971	Sri Lanka (Ceylon) 4 villages	N_1= 131 N_2= 117 N_3= 99 N_4= 25	87%-89% of drawn samples	3 villages: household lists 1 village: an electoral list	1-shot case study	1 (compared with with 1951 study)
33. Hofstetter, Zukin, & Buss (1978)	Oct. 3-Nov. 4, 1972	National	1,034	Not given	Primary Sampling Units, stratified into 4 sub-samples	1-shot case study	1
34. Kanervo (1979)	1974	Barquisimeto, Venezuela	636 (206 from panel + 430)	Not given	Households, area wide sampling	Panel + separate sample	Only 1 wave reported
35. Kent & Rush (1976)	Early Nov. 1974	Gainesville, Fla.	N_1= 59 N_2= 68 N_3= 23	N_1: 59% N_2: 61% N_3: 82%	Elderly in 3 organizations, non-random	1-shot case study	1
36. Kraus, Mehling, & El-Assal (1963)	Not given	Medium-sized Mid-western college town	236	94% of drawn sample	Residents, area wide sampling	1-shot case study	1
37. Larsen & Hill (1954)	Aug. 1-3, 1953	Seattle, Wash. (2 community areas)	147 faculty community, 137 laboring community (not random)	94% faculty, 78% laborers	All adult residents, faculty; all adults in every other house, laborers	1-shot case study comparing communities	1
38. Levy (1969)++	Not given, approx. 1968-69	National	1,200	Not given	12 respondents selected from each of 100 "sampling pts."	1-shot case study	1
39. Lounsbury, Sundstrom, & DeVault (1979)	August 1975	Trousdale County, Tenn.	288 (from T_2 of panel)	Not given (T_2 N 82% of T_1 N)	Listings in "public directories"	2-wave panel	1 wave reported of 2
40. McNelly & Deutschmann (1963)	3-day period in 1962	San José, Costa Rica	150	96.2% of drawn sample	Male household heads in 3 barrios of high, low, med. SES	1-shot case study	1
41. McNelly & Molina (1972)	Jan.-Feb. 1969	Lima, Peru	632	81.5% of drawn sample, but 2.3% refusal rate)	Male household heads (no other information)	1-shot case study	1
42. McNelly, Rush & Bishop (1968)	April 15, 1967	Madison, Wisc.	273	Not given	Adults in city (no other information)	1-shot case study	1
43. Medalia & Larsen (1958)	April 19, 1954	Seattle, Wash.	964	96% of drawn sample	Listings in telephone directory	1-shot case study	1
44. Miller & MacKuen (1979)	Mid-Sept., early Nov. 1976	National (Ctr. for Political Studies)	2,875	Not given	Not given	2 waves, separate samples	2

TABLE 1, continued (Characteristics of Samples)

AUTHORS	DATE OF RESEARCH	LOCATION OF RESEARCH	SAMPLE SIZE*	COMPLETION RATE	POPULATION*	DESIGN*	NO. OF POINTS IN TIME
45. Neuman (1976)	Spring 1971	San Francisco Bay Area	232 (75% of news-viewing households)	Not given	Listings in telephone directories	1-shot case study	1
46. Nnaemeka (1976)	Oct.-Nov. 1975	3 small suburban communities in an urban county; 6 sample units in rural county Minnesota)	140 (suburban communities) 136 (rural communities)	93.3% of drawn sample—urban: 91.7% of drawn sample—rural.	Households in suburban communities and rural towns & townships, area wide sampling.	1-shot case study (comparison of urban & rural areas)	1
47. Palmgreen (1979)	Nov. 1973	Toledo, Ohio	189 (local issue sample 184 (natl.) issue sample)	Not given (See 1975 Ph.D. dissertation, U. of Mich.)	Every other household w/in selected block clusters	1-shot case study	1
48. Robinson (1972)	1968 (other data reported also)	National (SRC**)	Not reported	Not given	Not given	Not given	1
49. Robinson (1967)	1. 1964 2. 1964	1. Detroit area 2. National	1. 557 2. 1,429	Not given Not given	Not given for either study	1-shot case studies	1. 1 2. 1
50. Rogers (1963-66)	1963-64	5 villages in Colombia (modern & traditional compared)	225	100%	All farm operators	1-shot case study, comparing villages	1
51. Shingi & Mody (1976)	1972	The Majafgarh Block in Delhi Union Territory, India	Treatment: 80, T_1 & 48 at T_2 (30 saw both programs) Comparison village: 73	100% at T_1, treatment N at T_2 is 60% of of T_1 N (38% of T_1 N saw two shows)	Lists of farmers attending teleclubs in 2 villages, compared with non-teleclub group.	2-wave panel treatment group, pretest only comparison group	2 treatment. 1 comparison
52. Spitzer & Denzin (1965)	Nov. 1963	6 broad urban locales & a rural area in Midwestern community	151	Not given	Not given	1-shot case study	1
53. Star & Hughes (1950)	Sept. 1947 & Mar. 1948	Cincinnati, Ohio (NORC+)	Pre-test: 745 Posttest: 592 panel + 758 new sample	Not given	Not given	Panel + separate sample posttest	2
54. Stauffer, Frost & Rybolt (1978)	May-June 1977	Suburban Boston Students; Worcester/Brockton adults in non-reader programs	67 students 61 non-readers (experimental) 20 students in control group	Not given (not random samples)	Undergraduates experimental & controls, adult non-readers in experimental group	Non-random, experimental & controls, posttest only	1
55. Tichenor, Donohue, & Olien (1980)	1969, '70, '71, '72, '76	19 Minnesota communities (urban, rural, suburban)	Ranges from 88 to 183	Overall rate 91.7% of drawn sample	Area wide sampling of designated community	1-shot case studies & 2-wave separate sample	1 & 2
56. Tichenor, Donohue, & Olien (1970)	1. See #15 (Budd, et al) 2. 1949-65 (AIPO/Roper) 3. 1960 4. Apr. 1968	1. See #15 2. National 3. Not given 4. Minneapolis-St. Paul, Minn.	1. See #15 2. Not given 3. 295 strike cmty, 96 in non-strike cmty. 4. 600	1. See #15 2, 3. Not given 4. 94% of drawn sample	1. See #15 2. Not given 3. Not given 4. Households, area wide sampling	1. See #15 2. Not given 3. 1-shot communities compared 4. 1-shot case study	1. 1 2. 2-4 3. 1 4. 1
57. Tichenor, Rodenkirchen, Olien, & Donohue (1973)	1969 Spring 1970 Fall 1970 Spring 1971	15 communities in Minnesota	Not given (See Tichenor, et al, 1980)	Ranges from 86% to 100% of drawn samples	Not given (See #55, Tichenor, et al. 1980)	1-shot case studies (communities compared)	1

TABLE 1, continued (Characteristics of Samples)

AUTHORS	DATE OF RESEARCH	LOCATION OF RESEARCH	SAMPLE SIZE*	COMPLETION RATE	POPULATION*	DESIGN*	NO. OF POINTS IN TIME
58. Wade & Schramm (1969)	1957 science 1964 public affairs	National (SRC**)	1957: 1,919 1964: 1,370	Not given Not given	Not given for either topic	1-time poll data (1964 poll is 4th of 4 waves)	1. 1 2. 1

* All samples are random samples, unless otherwise noted.

** SRC = University of Michigan Survey Research Center.

+ NORC = National Opinion Research Center, University of Chicago.

++ See footnote 5 for other studies of the same event, President Kennedy's assassination.

TABLE 2: TOPICS, KNOWLEDGE CHARACTERISTICS, AND DATA COLLECTION METHODS

AUTHORS	INTERVIEW METHOD	TOPICS	TYPE OF OF KNOWLEDGE	HOW KNOWLEDGE IS MEASURED (OPERATIONAL DEFINITIONS)
1. Abbott (1978)	Mail	Energy	Depth	Score computed from number of correct responses to 16-item test with yes/no and multiple choice answers.* Same test given before and after campaign.
2. Adams, Mullen, and Wilson (1969)	Phone	Pope Paul's Encyclical reaffirming Catholic Church's position on birth control	Awareness	Nominal: had respondent heard about the event by time of interview.+
3. Allen & Colfax (1968)	Not clear if phone or in-person	President Lyndon Johnson's decision not to run again for President	Awareness	Nominal: had respondent heard of Johnson plans for election by time of interview*
4. Atkin, Galloway & Nayman (1976)	1. In-person 2. In-class questionnaire	1. Presidential election & general civics-type information 2. National, state, local campaign information	Depth	1. Score computed from number of correct answers to 6-item test+ 2. Score computed from number of correct answers to a number of questions+
5. Bailey (1971)	Phone	Earth Day ("E-Day") to promote awareness of environment, ecology on April 22, 1970	Awareness	5-point index computed from answers to 2 items: 5 = knowledge of both items: (1) what did the "E" stand for?+ (2) what was the date of E-Day?+ Same questions at T_1 and T_2.
6. Becker, Sobowale, Cobbey, & Eyal (1978)	Phone	1976 Presidential election debates (important things about the candidates and their stands on issues)	Awareness & depth	1. Could respondents name 1 or more important things about Ford, Carter* (asked in all 3 waves) 2. Did candidate favor/oppose each of several issues+ (asked 1st 2 waves)
7. Becker & Whitney (1980)	Phone	Local: name mayor & party, give information on busing & solid waste disposal. National: name Congressman & party, give information on Panama Canal, foreign oil dependence	Depth	4 items summed to create index of local knowledge/national knowledge+ (range 0-4)
8. Benton & Frazier (1976)	In-person	The economy (problems, causes, solutions; pro & con rationales for solutions; actors on issue)	Awareness & depth	Not described (questions were open-ended)+ Apparently both nominal and continuous measurement.
9. Berelson, Lazarsfeld, & McPhee (1954)	In-person	Presidential candidates' stands on issues in the 1948 campaign	Awareness	Nominal: hearing of Taft-Hartley law, stands of Truman and Dewey on it. Stands of each on price controls.*
10. Bishop, Oldendick, & Tuchfarber (1978)	Phone	1976 Presidential election debates	Awareness & depth	1. 5-point index based on answers to set of items on 4 issue stands of Ford & Carter.** 2. Nominal: awareness of any important difference between the two candidates.+
11. Bogart (1957-58)	In-person	Universal Declaration of Human Rights, ideals of freedom common to Greece & U.S., individuals' rights	Awareness & depth	Awareness (nominal) of a list of rights of citizens in a democracy+ Same questions at T_1 and T_2 .
12. Bogart (1950-51)	Phone (random sample)	Local girl selected to appear on New York Philharmonic radio broadcast	Awareness	Nominal: had respondent heard of the event (asked about 3 weeks later)+
13. Brinton & McKown (1961)	Mail questionnaires distributed to homes	Fluoridation (hot topic in Palo Alto paper read by respondents in Menlo Park, where topic was not hot)	Depth	Score computed from number of correct answers to 10-item multiple choice test+
14. Brown Ettema & Luepker (1981)	Not given (may be in-person)	Health: prevention of cardiovascular disease	Depth	Score computed from sum of number of correct answers to 10-item test+ (not clear if same test given before and after campaign)
15. Budd, MacLean, & Barnes (1966)	Phone	Ouster of Premier Khrushchev in USSR (10/13/64); arrest of Presidential aide Walter Jenkins on morals charge (10/14/64)	Awareness	Nominal: had respondent heard of either event by time of interview+

TABLE 2, continued (Topics, Knowledge, Data Collection Methods)

AUTHORS	INTERVIEW METHOD	TOPICS	TYPE OF KNOWLEDGE	HOW KNOWLEDGE IS MEASURED (OPERATIONAL DEFINITIONS)
16. Buss & Hofstetter (1981)	In-person (also questionnaires completed)	Employment opportunities for steelworkers. Also identification of mayor, Congressman, governor	Depth	Score computed from sum of number of correct answers to 3 questions about steelworkers.+ Also, score for 3 questions about government leaders.+
17. Clarke & Kline (1974)	Not given	National public affairs issues, personal relevance, solutions, actors (respondent chooses topic)	Depth	Number of solutions, actors, positive cognitions, negative cognitions. Name national problems, most important one, what government should work on most to solve** (open-ended)
18. Deutschmann (1963)	Not given (probably in-person)	Public affairs: name president, dept. governor, nearby mayor, the cardinal, explain a political agreement	Depth	Score based on number of correct answers to 6-item test (range 0-5)+
19. Deutschmann & Danielson (1960)	Phone (all 6 samples)	Eisenhower's stroke, Explorer I satellite, Alaskan statehood	Awareness	Nominal: had respondent heard of the event by time of interviewing?+
20. Donohue, Tichenor, & Olien (1975)	In-person	Mining in wilderness area, environmental restrictions on taconite plant, air & water pollution, steel plant closing, political regionalization, sewage control. Compared with breakfast cereal nutrition	Awareness & depth	Nominal: had respondent heard of issue.* Also, index based on number of accurate statements respondent made, as judged by experts.*
21. Douglas, Westley, & Chaffee (1970)	Questionnaires at homes to be mailed	Mental retardation	Depth	Score of number of correct answers to 6-item test. (Not clear if same test given before & after campaign)+ (Also, 10 items on content of campaign, but no ed. data on this)+
22. Douglass & Stacey (1972)	Not given	Fluoridation	Awareness	Nominal: had respondent read or heard of issue. Could respondent describe its purpose (list)*
23. Edelstein (1973)	In-person	Vietnam War (why it is an important problem, number of proposed solutions, etc.)	Depth	Nominal: 2-way tables presented for data on different types of knowledge by level of education*
24. Erskine (1962, 1963a, b, c)	Not given (probably in-person)	International & national issues such as Franco regime, polio vaccine, etc.	Awareness	Nominal: had respondent heard of topic*
25. Fathi (1973)	Phone	News of marriage of Prime Minister Pierre Trudeau	Awareness	Nominal: had respondent heard of news by evening of 1st day announced+
26. Fry (1979)	Phone	Name & party of Congressman, mayor; possible solutions to garbage problem	Depth	Score computed from number of correct answers to 3 questions+
27. Galloway (1977)	Not given (probably in-person)	10 agricultural & 5 health-related innovations	Depth	Score computed from summing number of innovations of which respondent had heard+
28. Gallup poll (1977)	In-person	Fluoridation	Awareness	Nominal: ability to pick item on a card which best describes purpose of water fluoridation*
29. Gantz (1978)	Telephone	Items in TV newscast watched on evening of interview	Awareness	Recall of an item on the television newscast watched the evening of interview — either a) unaided recall, b) recall with aid, or c) recognition of item mentioned by interviewer.
30. Garramo (1982)	Telephone	Neighborhood issues: housing, economic development, schools, and crime	Awareness and depth	1) Nominal: ability of respondent to name any aspect of an issue. 2) Score of numbers of elements of issue mentioned in answer to four questions about each issue (information in general, actors involved, causes, and solutions). Respondents could name as many elements as they wished.

TABLE 2, continued (Topics, Knowledge, Data Collection Methods)

AUTHORS	INTERVIEW METHOD	TOPICS	TYPE OF KNOWLEDGE	HOW KNOWLEDGE IS MEASURED (OPERATIONAL DEFINITIONS)
31. Genova & Greenberg (1979)	Phone	Potential impeachment of President Nixon. National Football League (NFL) strike	Depth	Index based on number of correct answers to 6 items (names, dates, places, relationships, reasons, etc.)+ 2 items same pre- & post, 4 items different
32. Gunaratne (1976 approx.)	In-person	Mechanical & scientific knowledge, national, international affairs, demonetization, family planning	Depth	Score based on number of correctly answered items, for each topic.* (5 topics)
33. Hofstetter, Zukin, & Buss (1978)	In-person	Name Democratic & Republican Congressional candidates, major party Vice-Presidential candidates	Depth	Scale based on number of correct answers to several questions+
34. Kanervo (1979)	Not given (probably in-person)	Public affairs/civics-type information	Depth	Score based on number of correct answers to 8 questions (not clear how score is computed exactly)*
35. Kent & Rush (1976)	In-person	Amnesty for Vietnam War resisters	Awareness	Nominal: ability of respondent to name at least 1 correct item about issue*
36. Kraus, Mahling, & El-Assal (1963)	In-home questionnaire completion	Radioactive nuclear fallout (nature of issue, effects, methods of protection)	Depth	Score based on number of correctly answered questions+
37. Larsen & Hill (1954)	In-person	Death of Senator Robert A. Taft, "Mr. Republican"	Awareness	Nominal: had respondent heard of event by time of interview*
38. Levy (1969)++	Not given	Assassinations of 6 political figures during past 6 years++	Awareness++	Nominal: had respondent heard of each event+ (All events had occurred during previous 6 years)++
39. Lounsbury, Sundstrom, & DeVault (1979)	In-person	Nuclear power plant under construction in local area (number of reactors, etc.)	Depth	Score of number of correct answers to 7 multiple-choice items+
40. McNelly & Deutschmann (1963)	In-person	Items in the news for some time: a political party, local dairy, the U.N., etc.	Awareness & depth	Score on 6-item test, according to degree of correctness of each answer (fully correct, partially correct, etc. Computed by item & also all together)+
41. McNelly & Molina (1972)	In-person	Foreign affairs: identify photos of 10 foreign leaders, name their countries, 10 other questions	Depth	Index based on number of correct responses to 28 questions+ (2 questions of 30 dropped)
42. McNelly, Rush & Bishop (1968)	Phone	1. Diffusion of news: call for Latin American Common Market, London elections. 2. Identity of 7 foreign leaders & their countries	Awareness & depth	1. Nominal: had respondent heard of events by 2-3 days later.+ 2. Score of number of correct answers to leaders/countries questions.+
43. Medalia & Larsen (1958)	Phone	News of non-existent "windshield-pitting epidemic"	Awareness	Nominal: had respondent heard of topic (after it had been in the news for some time)*
44. Miller & MacKuen (1979)	Not given	1976 Presidential election debates (candidate and policy information)	Depth	Score based on number of correct answers to series of open-ended and structured questions** Not clear if same questions at T_1 and T_2 .
45. Neuman (1976)	Phone	Topics recalled from network news broadcasts on television	Awareness & depth	Number of stories recalled, number recalled with details (aided and unaided recall of each type)*
46. Nnaemeka (1976)	In-person	Power line corridor issue, open meeting law issue, railroad abandonment	Awareness & depth	Score of number of correct answers to series of questions*, also nominal—data in N-way tables.
47. Palmgreen (1979)	In-person	Important problems (local & national) named by respondent), actors, solutions	Depth	Index of number of actors and proposed solutions connected with the problem named**

TABLE 2, continued (Topics, Knowledge, Data Collection Methods)

AUTHORS	INTERVIEW METHOD	TOPICS	TYPE OF KNOWLEDGE	HOW KNOWLEDGE IS MEASURED (OPERATIONAL DEFINITIONS)
48. Robinson (1972)	Not given (probably in-person)	Foreign affairs & Presidential election information	Depth	Index based on number of correct answers to 4 items*
49. Robinson (1967)	Not given (probably in-person)	1. Characteristics of countries (location, atomic capabilities, ideology, etc.) 2. Red China	Depth (both)	1. Score based on number of correct answers to 16 questions+ 2. Score based on number of correct answers to 4 questions*
50. Rogers (1965-66)	In-person	Name of district representative to national legislature in Colombia, etc.	Depth	5-item scale based on number of correct answers to 5 questions+
51. Shingi & Mody (1976)	In-person questionnaire completion	Potato farming and late wheat sowing	Depth	Index based on correct answers to 23 items (same questions asked before and after the teleclub programs)+
52. Spitzer & Denzin (1965)	Not given (may be in-person)	Assassination of President Kennedy	Depth	Weighted score (range 0-12) based on number of correct answers to 4 questions*
53. Star & Hughes (1950)	Not given (probably in-person)	The United Nations (U.N.)	Awareness & depth	Nominal: ability to name main purpose of U.N. and to make correct choices from list of 4 correct and 2 incorrect items about the purposes** Same questions at T_1 and T_2 .
54. Stauffer, Frost, & Rybolt (1978)	In-person (questionnaires--written & oral)	Topics in the news on an ABC TV news broadcast taped about 6-7 months before experiment conducted (none were major news)	Awareness & depth	List of all news stories recalled after viewing. Score of number of correct answers to 23-item multiple-choice test+
55. Tichenor, Donohue, & Olien (1980)	In-person	Nuclear power, mining & metals industries, political regionalization, water quality, power line	Awareness & depth	Nominal: had respondent seen or heard anything about issue* Also score of number of accurate statements about issue*
56. Tichenor, Donohue, & Olien (1970)	1. See #15 2, 3. Not given 4. In-person	1. See #15, Budd, et al 2. Earth satellites, space flight to moon, cigarette-cancer controversy. 3. Current events. 4. Medical, biological, social science topics in the news	1. See #15 2. Awareness 3. Depth 4. Depth	1. See #15, Budd, et al. 2. Nominal: topic awareness+ 3. Score of correct answers on 11-item test+ 4. Index of number of accurate statements about content after article was read by respondent* (rated above middle of 7-pt. scale)
57. Tichenor, Rodenkirchen, Olien, & Donohue (1973)	In-person	Nuclear power, mining & metals industries, political regionalization, water quality	Awareness & depth	Nominal: had respondent seen or heard anything about issue* Also score of number of accurate statements about issue*
58. Wade & Schramm (1969)	Not given (probably in-person)	1. Science topics 2. Public affairs topics related to Presidential campaign	Awareness (both topics)	Nominal: seen or heard of topic/issue (both science and public affairs)+

* Exact question wording is given in article or paper.

** Exact question wording is not given, although some examples of question wording are provided.

\+ Exact wording of questions is not given in article or paper.

++ See footnote 5 for seven other studies of President Kennedy's assassination, all of which found 100% of respondents informed of the event.

TABLE 3: MEASUREMENT OF MEDIA, EDUCATION, AND KNOWLEDGE GAP

AUTHORS	AMOUNT OF MEDIA PUBLICITY	TYPE OF MEDIA INVOLVED (WHAT WAS MEASURED?)	HOW IS EDUCATION MEASURED?	HOW KNOWLEDGE GAP IS MEASURED	WAS GAP FOUND? (ANY CHANGE OVER TIME?)
1. Abbott (1978)	High Exposure vs. non-exposure	Recall of seeing 1 or more articles of more than 20 published during year-long information campaign in morning newspaper+	Question wording not given+, ("Years of formal schooling")	Differences in proportions of 7 education groups with knowledge of issue (Chi squares)	Yes But little or no increase if respondent saw articles. If respondent did not see any, gap did increase.
2. Adams, Mullen, & Wilson (1969)	Moderate to high	Exposure to all available media or interpersonal news sources+	+	Not clear--seems to be comparison of proportions of high & low education groups	Yes
3. Allen & Colfax (1968)	High	How respondent first heard the news--media, interpersonal sources*	+	Comparison of SES traits of knowers vs. non-knowers	Yes
4. Atkin, Galloway, & Nayman (1976)	Moderate to high	Frequency of exposure to newspaper, radio, TV campaign programs, magazines*	1. Wording not given 2. Not relevant	1. Correlation coefficient 2. Not relevant	1. Yes (national sample) 2. Not relevant (student sample)
5. Bailey (1971)	Moderate to high	Recall of when/how respondent first heard about E-Day+	+	Difference in mean knowledge scores of grade school education group vs. advanced degree group	Yes Gap decreased slightly over time; less educated showed slightly greater gains than others
6. Becker, Sobowale, Cobbey, & Eyal (1978)	Moderate to high	Exposure to the debates on radio or television+	+	Comparison of "better educated" and "less educated" groups (how comparison made not clear)	Yes But less educated people exposed to debates gained information (amount of gain not clear)
7. Becker & Whitney (1980)	Moderate to low	Dependency on newspaper or television, score based on answers to 4 questions*	+	Comparison of mean knowledge scores of high & low ed. groups, also path coefficients	Yes Larger gap for national than local issues, regardless of dependency
8. Benton & Frazier (1976)	Moderate to high	Exposure to 3 national network TV stations news programs on issue, newspapers, news magazines+ (These media content analyzed also)	+	Correlation coefficient, also comparison of proportions of high & low ed. groups with knowledge	Yes Consistently, high education respondents held more knowledge; moderate correlation, .23
9. Berelson, Lazarsfeld, & McPhee (1954)	High	Media use, exposure to information about the campaign in media or personal discussion*	Last school attended* (6 categories)	Differences in proportions of 4 education groups with accurate perceptions of candidates' stands	Yes
10. Bishop, Oldendick & Tuchfarber (1978)	Moderate to high	Exposure to debates on radio or television, media use+	+	Correlation coefficient for education and knowledge	Yes Moderate correlation of .24
11. Bogart (1957-58)	Moderate Exposure vs. non-exposure	Exposure to 14 ads in 4 newspapers, twice weekly for 6 weeks; sending for booklet, picking one up+	+	Differences in proportions of high, low & moderate SES groups aware of rights	Yes Gap did not change between T_1 and T_2
12. Bogart (1950-51)	Moderate to high	Exposure to information in newspapers, radio, conversations+	+	Differences in proportions of high & low ed. groups with knowledge	Yes
13. Brinton & McKown (1961)	High Exposure vs. non-exposure	Reading Palo Alto newspaper, sources of information on issue+; paper gave high coverage during 3-month period.	+	Comparison of mean knowledge scores of 5 ed. groups, readers vs. non-readers	Yes Readers have more knowledge than non-readers w/in each education group

TABLE 3, continued (Measurement of Media, Education, and Knowledge Gap)

AUTHORS	AMOUNT OF MEDIA PUBLICITY	TYPE OF MEDIA INVOLVED (WHAT WAS MEASURED?)	HOW IS EDUCATION MEASURED?	HOW KNOWLEDGE GAP IS MEASURED	WAS GAP FOUND? (ANY CHANGE OVER TIME?)
14. Brown, Ettema, & Luepker (1981)	High Exposure vs. non-exposure	T_1 : 20-week information campaign in newspapers, radio. T_2 : similar campaign	"A standard scale of years of schooling"+	Betas for treatment & comparison communities at T_1 (pre-campaign & T_3 (post)	Yes Gap found at T_1, but it closed by T_3 in treatment community (did not close in other cmty)
15. Budd, MacLean, & Barnes (1966)	Moderate to high	First source of information about each event+	+	Differences in proportions of knowers in highest & lowest ed. groups (3 groups)	Yes Gap found for both events, although they differed in importance
16. Buss & Hofstetter (1981)	(Steel: high publicity) Exposure vs. non-exposure. (Pol.: low publicity)	Sources of information about steel crisis & about politics, especially newspapers, radio, personal contacts*	+	Comparison of mean knowledge scores of 4 types of steel-worker groups, who vary in amount of education	Yes Reverse gap for steel crisis and political knowledge (mean score differences not very large)
17. Clarke & Kline (1974)	Not known	Channels of communication used for information on issue named+	+	Tau-B correlations between levels of ed. & info-holding	Yes Moderate correlation of .28.
18. Deutschmann (1963)	Not clear	Exposure to/ownership of radio, books, newspapers, movies+	Education & literacy measured+	Difference in knowledge scores of illiterates, literates	No (comparison of literate/illiterate groups, not by ed.)
19. Deutschmann & Danielson (1960)	Not clear	First source of information about the event*	+	Differences in proportions of high & low ed. knowers	Yes For all 6 samples combined, amount of gap is small
20. Donohue, Tichenor, & Olien (1975)	Coverage varies by community	Index: no. of newspaper articles about an issue multiplied by proportion of respondents who read paper in which the article appeared	"Number of years of schooling"+	Pearson correlation coefficient for ed. & knowledge; difference in proportions of high & low education groups with knowledge; rank correlations for the 16 communities	Yes Breakfast cereal nutrition No When community is homogeneous, issue is of basic concern to community, waning public attention
21. Douglas, Westley, & Chaffee (1970)	High exposure vs. non-exposure	Extensive information campaign for about 6 months, media, club speakers, posters, etc.	+	Comparison of mean knowledge scores of high, medium, & low ed. groups	Yes Gap narrows, low ed. group gained .41 pt. in score, other 2 ed. groups decreased in scores
22. Douglass & Stacey (1972)	Not known	Either not measured or not reported	+	Differences in proportions of 4 ed. groups with knowledge	Yes Large gap
23. Edelstein (1973)	High to moderate	Sources of information about Vietnam, ranking of sources' usefulness*	"No. of years in school"+	Differences in proportions of high & low ed. knowers	Yes Gap appears for each of a number of types of knowledge
24. Erskine (1962, 1963a,b,c)	Not known	(No information given)	+	Differences in proportions of high, medium, & low education groups with knowledge	Yes For 26 questions No For 6 questions (Of 6 asked over time, 2 increase, 3 decrease, 1 shows no change)
25. Fathi (1973)	Moderate to high	First source of information, media used for checking/acquiring more information +	+	Differences in proportions of 3 ed. knowers by evening of announcement	Yes But it is a reverse gap--least educated are most knowledgeable
26. Fry (1979)	Low to moderate	Score on dependency on newspapers or TV, same data as #7*	+	Comparison of mean knowledge scores of high & low ed. groups, analysis of variance	Yes The higher the newspaper dependence, the greater the gap, n.s.; TV: no difference
27. Galloway (1977)	Exposure vs. non-exposure	Exposure to radio & reading forums, 2 treatments; info. sources+	+	Differences in proportions of knowers among 13 SES strata	Mixed, tendency was for gaps to narrow over time

TABLE 3, continued (Measurement of Media, Education, and Knowledge Gap)

AUTHORS	AMOUNT OF MEDIA PUBLICITY	TYPE OF MEDIA INVOLVED (WHAT WAS MEASURED?)	HOW IS EDUCATION MEASURED?	HOW KNOWLEDGE GAP IS MEASURED	WAS GAP FOUND? (ANY CHANGE OVER TIME?)
28. Gallup poll (1977)	Not known	(Not measured)	+	Differences in proportions of 3 ed. groups with knowledge	Yes Large gap
29. Gantz (1978)	Exposure to newscast was measured.	Television newscast	+	Standardized Betas	No (Standardized Beta = .08)
30. Gaziano (1982)	High vs. low levels of publicity in neighborhood newspapers (2)	a. Number of news items about each of 4 issues, as dominant topic & as a subordinate topic. b. Number of column inches when topic is dominant. (The 2 neighborhood newspapers also content-analyzed)	3 categories+	Cramer's V coefficient for relationship between level of education (high, medium, low) and awareness of issue	Yes Knowledge gaps occurred for all 4 issues. They were larger for issues on which groups were active than for those on which activity was low. Gaps were smaller for issues receiving high or moderate coverage by neighborhood papers than for issues with low coverage. Group activity was related to knowledge gaps more strongly than was neighborhood paper publicity, however.
31. Genova & Greenberg (1979)	Moderate to high (not a variable)	Sources of information, media use, discussions+ (News coverage continuous for 10-day period)	6 "standard categories"+	Pearson correlation coefficient for education & knowledge, Betas also reported	Yes Factual knowledge gaps decreased, structural gaps did not change/increased
32. Gunaratne (1976 approx.)	Not known	Frequency of exposure to newspapers, movies, radio; content liked**	+	Comparison of mean knowledge scores of high & low SES groups	Yes Overall, for 5 topics; comparison with Ryan's data suggests increase
33.. Hofstetter, Zukin, & Buss (1978)	High	Use of radio, TV, newspapers, discussions; campaign information exposure*	+	Betas (standardized regression coefficients) for education & knowledge	Yes But media use highly associated with info. increases, especially for low & medium ed. groups
34. Kanervo (1979)	Not known	Time spent/frequency of use: radio, TV newspapers, magazines, discussions+	Actual no. of grades completed+	Path coefficients for knowledge & education	Yes Education & income are the key variables for information
35. Kent & Rush (1976)	High to moderate	Exposure to news magazines, books, movies, TV, radio, newspapers*	Amount of schooling (7 categories)*	Differences in proportions of 4 ed. groups with knowledge	Yes Education was much more strongly related to knowledge than any other variable
36. Kraus, Mahling, & El-Assal (1963)	High	Time spent with radio, newspapers, books, TV, movies, magazines; total use score computed+	+	Comparison of those with high/low knowledge by high, low education (Chi squared	Yes Gap occurred regardless of degree of total media exposure
37. Larsen & Hill (1954)	Moderate to high	First source of information, supplementary sources+	+	Differences in proportions of knowers in 2 communities	Yes Reverse gap: more of laboring community had heard
38. Levy (1969)++	High to moderate by event	First source of information about each of 6 assassinations+	+	Differences in proportions of knowers in 4 ed. groups	No 3 assassinations Yes 3 assassinations
39. Lounsbury, Sundstrom, & DeVault (1979)	Not known	(Either not measured or not reported)	Number of years of education+	Comparison of demographic characteristics of high & low knowledge groups	Yes 2 significant differences: ed. (high) & sex (female)

TABLE 3, continued (Measurement of Media, Education, and Knowledge Gap)

AUTHORS	AMOUNT OF MEDIA PUBLICITY	TYPE OF MEDIA INVOLVED (WHAT WAS MEASURED?)	HOW IS EDUCATION MEASURED?	HOW KNOWLEDGE GAP IS MEASURED	WAS GAP FOUND? (ANY CHANGE OVER TIME?)
40. McNelly & Deutschmann (1963)	High to moderate	Use of newspapers, TV, radio, magazines, books, movies+	+	Comparison of scores of high/low SES respondents, neighborhoods	Yes Even when media use was controlled
41. McNelly & Molina (1972)	Not known	Frequency, time spent: media, interpersonal; content attended to+	+	Pearson correlation coefficient; proportions of 3 SES strata	Yes Ed. especially for high SES strata; media predict better for low SES strata
42. McNelly, Rush & Bishop (1968)	At least moderate	Use & ownership of major news magazines, TV, metro, newspapers+	+	Pearson correlation coefficient; comparison of high & low knowers	1. Yes (diffusion of 2 foreign events) 2. Yes (leaders)
43. Medalia & Larsen (1958)	High	First source of information*	+	Comparison of characteristics of non-knowers & knowers	Yes Low education is 1 of 4 characteristics of non-knowers
44. Miller & MacKuen (1979)	High to moderate	Exposure to debates on TV or radio; media habits+	+	Unstandardized regression coefficients for ed./knowl.	Yes Amount of gap initially not clear; all gained info.
45. Neuman (1976)	Not a variable	Exposure to all/part of an evening TV network newscast; media habits+	+	Differences in proportions of high & low ed. groups who recall topics	Yes Only very slight gap for unaided recall, aided recall w. details; reverse gap for aided recall with details
46. Nnaemeka (1976)	Varied w. issue, community	Preference for, time spent with, frequency of use of TV, newspapers, radio* (Content of newspapers coded)	Highest grade completed* (6 categories)	Differences in proportions of high & low education groups aware of topics	Yes Urban sample with newspapers using established sources No Rural sample, papers using more non-establishment sources
47. Palmgreen (1979)	High vs. low, is variable	Number of stories in Toledo newspapers/TV for 2 weeks coded; media exposure+	Number of years of formal education+	Path coefficients for political information-holding and education	Yes For national issues No For local issues
48. Robinson (1972)	High	Use of newspapers, TV, radio, magazines during 1968 campaign+	+	Comparison of mean knowledge scores of 3 ed. groups	Yes
49. Robinson (1967)	Not known	1. Use of several types of magazines; foreign news in newspapers; TV, radio+ 2. No data on media use (1967 knowledge data compared with 1957 media use data)	1. + 2. +	Comparison of mean knowledge scores among 6 groups based on education, race, income--for both surveys	1. Yes 2. Yes
50. Rogers (1965-66)	Not known	Exposure to newspapers, radio, magazines, TV, films: total index+	Years of education+ Literacy*	Comparison of scores of literates and illiterates	Yes But media exposure is an intervening variable
51. Shingi & Mody (1976)	Comparison of teleclub, nonteleclub villages	Attendance at 1-2 teleclub programs 1 week. Programs taped.	+	Correlation coefficients for education, information score, other SES factors	No Some SES-related factors at work, non-SES factors also
52. Spitzer & Denzin (1965)	High	Initial & supplementary news sources+	+	Comparison of characteristics of high & low knowers	Yes SES-factors are among characteristics of low knowers
53. Star & Hughes (1950)	High	Exposure to materials & information through a variety of media & organizational sources*	+	Data given for those "reached" by campaign; education-knowledge data not shown	Yes Those reporting campaign exposure are the same as those initially most knowledgeable
54. Stauffer, Frost, & Rybolt (1978)	Exposure vs. non-exposure	Media use, attitudes toward TV news.+ Exposed to 1 news show in exper. treatment	Not applicable to students. Adults+	Comparison of college groups with adult non-readers (whose education is low)	Yes College group exposed to show had much higher average scores than adults

TABLE 3, continued (Measurement of Media, Education, and Knowledge Gap)

AUTHORS	AMOUNT OF MEDIA PUBLICITY	TYPE OF MEDIA INVOLVED (WHAT WAS MEASURED?)	HOW IS EDUCATION MEASURED?	HOW KNOWLEDGE GAP IS MEASURED	WAS GAP FOUND? (ANY CHANGE OVER TIME?)
55. Tichenor, Donohue, & Olien (1980)	Varies with issue, community	Preference for, time spent, frequency of use of TV, newspapers, radio; recent discussion*	+	Pearson correlation coefficient for ed. & knowledge; difference in proportions of high & low ed. groups with knowledge	Yes Breakfast cereal nutrition No High levels of discussion, conditions listed for #20, 57
56. Tichenor, Donohue, & Olien (1970)	1. See 13 2. High 3. Varies 4. Varies	1. See #13, Budd, et al 2. Inferred from report. 3. Newspaper strike vs. non-strike conditions 4. Degree of publicity given to topics on front pages of papers	1. See 13 2. + 3. + 4. +	1. See #13 2. Correlation coefficients 3. High & low ed. gr. scores compared 4. Correlation coefficients	1. Yes (See #13) 2. Yes Gap increases over time 3. Yes 4. Yes The more publicized the topic, the larger the knowledge gap.
57. Tichenor, Rodenkirchen, Olien, & Donohue (1973)	Varies by issue, community	Media coverage index (See description in #20) Also questions on media use, discussion**	+	Pearson product-moment correlation for ed., knowledge; Rank correlations for communities	Yes See #20, 55 No Higher levels of newspaper coverage, higher levels of conflict
58. Wade & Schramm (1969)	Not known	1. Media used for science information+ 2. Newspaper, TV frequency; magazine articles; pol. info. sources*	1. + 2. +	1, 2. Differences in proportions of 4 education groups with knowledge	1. Yes (science) 2. Yes (public affairs)

* Exact question wording is given in article or paper.

** Exact question wording is not given, although some examples of wording are provided.

\+ Exact wording of questions is not given in article or paper.

↔ See footnote 3 for seven other studies of President Kennedy's assassination.

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